BIODIVERSITY DEVELOPMENT ASSESSMENT REPORT (BDAR)

2924, 2956, 2984, 3222 & 3234 Kyogle Road, Kunghur NSW 2484

Prepared for NCV Enterprises Pty Ltd
By Planit Consulting Pty Ltd

November 2020

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Certification

This Biodiversity Development Assessment Report (BDAR) has been prepared to address requirements of the NSW *Biodiversity Conservation Act 2016*, the Commonwealth *Environment Protection & Biodiversity Conservation Act 1999*, and the *Tweed Local Environmental Plan 2014*. To the best of my knowledge it presents true and relevant facts without omission, and draws conclusions from logical and reasonable interpretation of the facts. It is current at the date of issue, being 19th November 2020.

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Executive Summary

Planit Consulting has been commissioned by NCV Enterprises P/L to prepare a Biodiversity Development Assessment Report (BDAR) associated with a proposed concept Development Application (DA) for proposed multiple Rural Land Sharing Communities (RLSC's) known as 'Nightcap on Minjungbul'.

The subject site comprises twenty-one (21) allotments generally referred to as 2924, 2956, 2984, 3222 & 3234 Kyogle Road, Kunghur. The site has a total area of approximately 1584.34Ha. The site currently provides a multitude of structures/facilities across multiple allotments which consist of:

- Several dwellings;
- Camping grounds;
- Rural shed structures;
- Plantation Areas;
- Recreational structures (i.e. viewing platforms, sheds);
- Farmland/Plantation areas;
- Cabins; and
- Approximately 50km of existing unsealed roads.

This Biodiversity Development Assessment Report has been prepared in accordance with the NSW Biodiversity Assessment Method. The assessment determines that the project site contains the following features and biodiversity values:

Eight vegetation zones (both native and exotic and includes open water) occur within the Subject Site as follows:

- PCT 1073 / Zone 1: Moderate / Good Condition Pink Bloodwood – Tallowwood moist open forest of the far northern ranges of the NSW North Coast Bioregion;
- PCT 812 / Zone 1: Moderate / Good Condition Dunn's White Gum tall open forest of the ranges of the northern NSW North Coast Bioregion;
- PCT 812 / Zone 2: Low Condition Dunn's White Gum tall open forest of the ranges of the northern NSW North Coast Bioregion;
- PCT 1302 / Zone 1: Good Condition White Booyong – Fig subtropical rainforest of the NSW North Coast Bioregion;
- Plantation;
- Camphor Laurel Dominant Closed to Open Forest;
- Cleared Areas / Grassed Paddocks with Scattered Trees, Regrowth & Weed Thickets; and
- Open Water.

PCT 1302 conforms to the Endangered Ecological Community (EEC) 'Lowland Rainforest in the NSW North Coast and Sydney Basin Bioregion', which is listed as 'Endangered' under the NSW BC Act 2016. This same community is reflective of the 'Critically Endangered' 'Lowland Rainforest of Subtropical Australia' scheduled under the EPBC Act 1999. Areas reflective of this community is proposed to be retained.

Seven (7) threatened flora species scheduled under the *Biodiversity Conservation Act 2016* (BC Act) were identified within the study area during opportunistic and targeted threatened flora surveys. This includes the recently scheduled Scrub Turpentine (*Rhodamnia rubescens*) which has been recently listed as 'Critically Endangered' under the BC Act 2016.

Twenty-one (21) threatened fauna species under the BC Act and/or EPBC Act were identified during the survey effort; fifteen (15) mammals, five (5) birds and one (1) amphibian.

The proposal would result in direct impacts on ~106.58ha of native vegetation zones (PCT 812 Zone 1, PCT 812 Zone 2 and PCT 1073 Zone 1). In addition to this, the proposal would result in the removal of ~220.3ha of non-native/modified areas of the site. This includes areas of plantation and cleared/grassed paddocks. These figures are only preliminary as the proposal is only at a concept phase. These figures are at a 'worst case scenario' and is considered to be significantly reduced at the D.A stage.

This report outlines the measures taken to avoid, minimise and mitigate impacts to the vegetation and habitats present within the development site during the design, construction and operation of the development.

The subject site contains candidate SAII entities and have been assessed against the *Guidance to assist a decision-maker to determine a serious and irreversible impact document*).

It is anticipated that these retained areas of the subject site will be incorporated into a biodiversity stewardship site. This stewardship agreement protects and enhances ecological values through implementing management actions (i.e. weed control, pest control, native plantings) over a twenty-year period. A Preliminary Rehabilitation Plan has also been prepared for the proposal which details a proposed strategy for restoration works (such as weed removal), revegetation, monitoring, reporting, performance criteria and corrective actions.

Preliminary unavoidable impacts of the proposed development were calculated in accordance with the BAM by utilising the Biodiversity Assessment Method Credit Calculator (BAMC).

The BAM Calculator was used on the 19/11/2020 to determine the offset obligation for the removal of native vegetation (habitat for threatened species) within the proposed development area of the subject site. Calculations requires the purchase and retirement of 3167 ecosystem credits and 9900 species credits to meet the offset obligation (subject to future development consent conditions). The offset obligation can also be met by purchasing and retiring credits from the biodiversity credit market or by direct payment into the Biodiversity Conservation Fund. These are proposed to occur in stages.

1 Introduction

1.1 Overview

Planit Consulting has been commissioned by NCV Enterprises P/L to prepare a Biodiversity Development Assessment Report (BDAR) associated with a proposed concept Development Application (DA) for proposed multiple Rural Land Sharing Communities known as 'Nightcap on Minjungbul'.

This report outlines the results of flora and fauna investigations and describes Plant Community Types (PCTs), recorded flora and fauna species, habitat associations and ecological values of the proposed development footprint and surrounding areas.

1.2 Site Description & Location

The subject site comprises twenty-one (21) allotments generally referred to as 2924, 2956, 2984, 3222 & 3234 Kyogle Road, Kunghur. The site has a total area of approximately 1584.34Ha. The site currently provides a multitude of structures/facilities across multiple allotments which consist of:

- Several dwellings;
- Camping grounds;
- Rural shed structures;
- Plantation Areas;
- Recreational structures (i.e. viewing platforms, sheds);
- Farmland/Plantation areas;
- Cabins; and
- Approximately 50km of existing unsealed roads.

The site which form the concept for multiple Rural Land Sharing Communities are identified in the table below.

Table 1: Property Description

Existing Lot					
Description	**Area (ha)**	**Description**	**Area (ha)**	**Description**	**Area (ha)**
Lot 121 on DP134446	158.17	Lot 31 on DP755714	89.03	Lot 1 on DP1183098	3.02
Lot 3 on DP755714	37.93	Lot 32 on DP755714	125.45	Lot 4 on DP737440	90.82
Lot 5 on DP582299	134.10	Lot 22 on DP755714	46.54	Lot 34 on DP755714	47.04
Lot 1 on DP390311	162.27	Lot 19 on DP755714	48.56	Lot 2 on DP611556	122.40
Lot 35 on DP755714	30.75	Lot 8 on DP755714	16.19	Lot 1 on DP611556	5.08
Lot 11 on DP1194471	126.6	Lot 20 on DP755714	177.25	Lot 2 on DP582300	71.71
Lot 33 on DP755714	9.90	Lot 2 on DP1148316	81.51	Lot 2 on DP1235488	0.04
Total Area	**1584.38ha**			**Total number of Lots**	**21**

The site map is provided within **Figure 1** below.

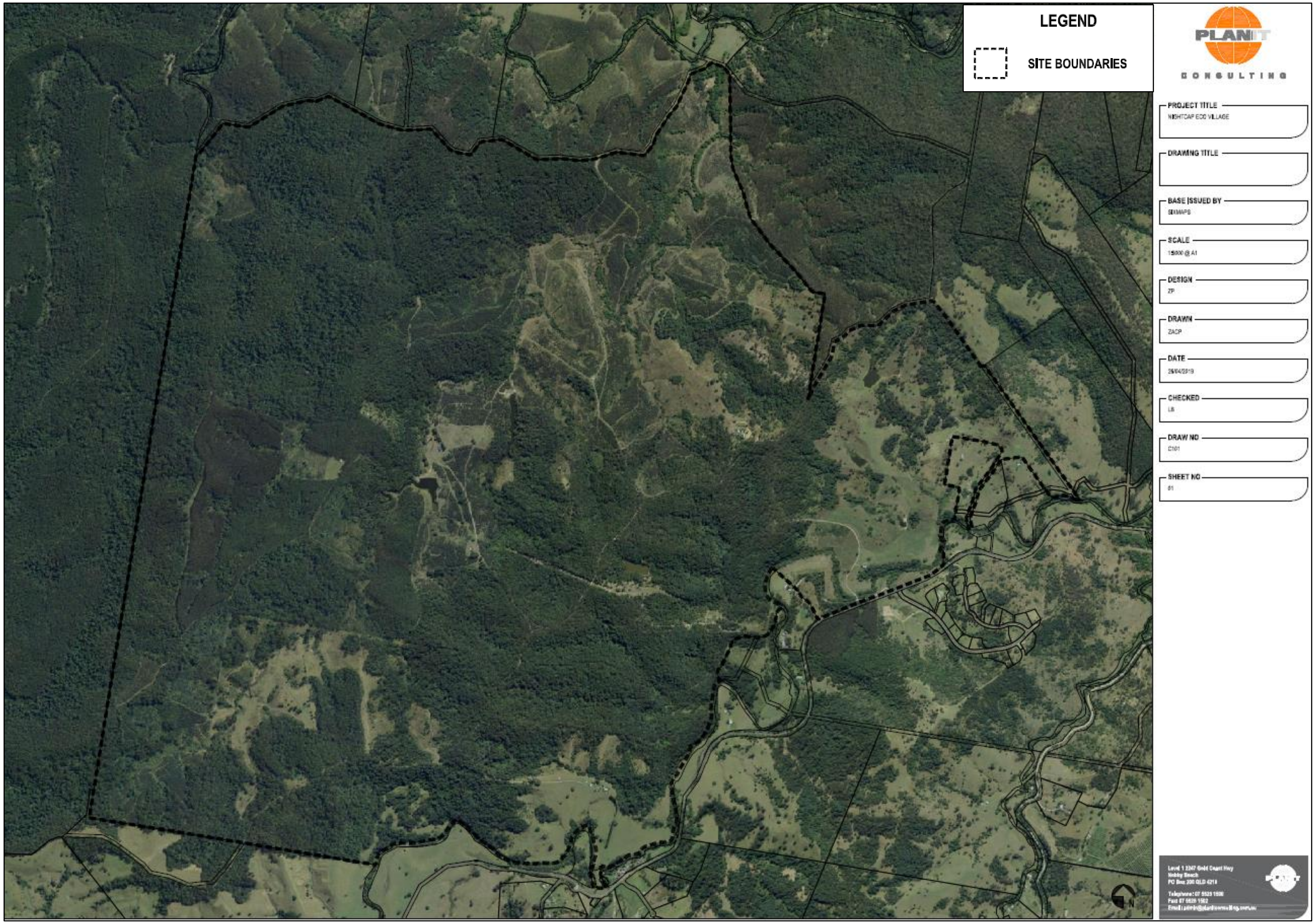

LEGEND
SITE BOUNDARIES
PLANIT
CONSULTING
PROJECT TITLE
NIGHTCAP ECO VILLAGE
DRAWING TITLE
BASE ISSUED BY
SIXMAPS
SCALE
15000 @ A1
DESIGN
ZP
DRAWN
ZACP
DATE
25/04/2019
CHECKED
LB
DRAW NO
C101
SHEET NO
01
Level 1 2247 Gold Coast Hwy
Nobby Beach
PO Box 200 QLD 4218
Telephone: 07 5526 1500
Fax: 07 5526 1502
Email: admin@planitconsulting.com.au
N

Figure 1: Subject Site Map

The subject site is largely bordered to the east by Kyogle Road, the Tweed River and large rural allotments. To the west the site adjoins Mebbin National Park. The southern and northern adjoining allotments are rural, comprising a similar combination of cleared and heavily vegetated areas.

The topography of the land is varied with grades ranging from 0° to in excess of 30°. Developable areas and roadways have considered the existing topography and been generally positioned on level areas of the site including along ridgetops. The site's altitude ranges between 80m - 220m above sea level.

In accordance with the *Tweed Local Environmental Plan (LEP) 2014* the site is zoned as RU2 Rural Landscape, RU5 Rural Village, and W1 Natural Waterway (refer to **Figure 2**).

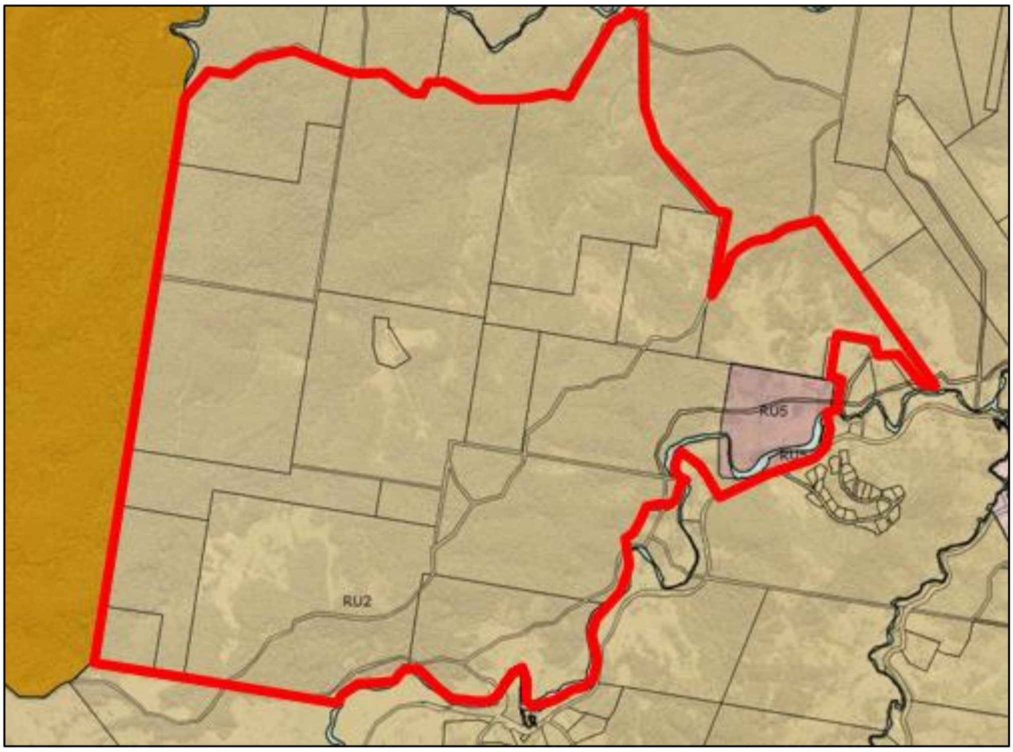


Figure 2: Zoning Plan (Source: Tweed LEP 2014)

The subject site has several plantation areas most recently understood to have been re-established in 1990's and covering over 330ha of the site (refer to **Figure 3**). Partial clearing of the site likely occurred for its most valuable timbers following its acquisition in 1909. The site also operated a dairy and several small 'case mills' making packaging cases and boxes from locally sourced timbers from 1953-1963.

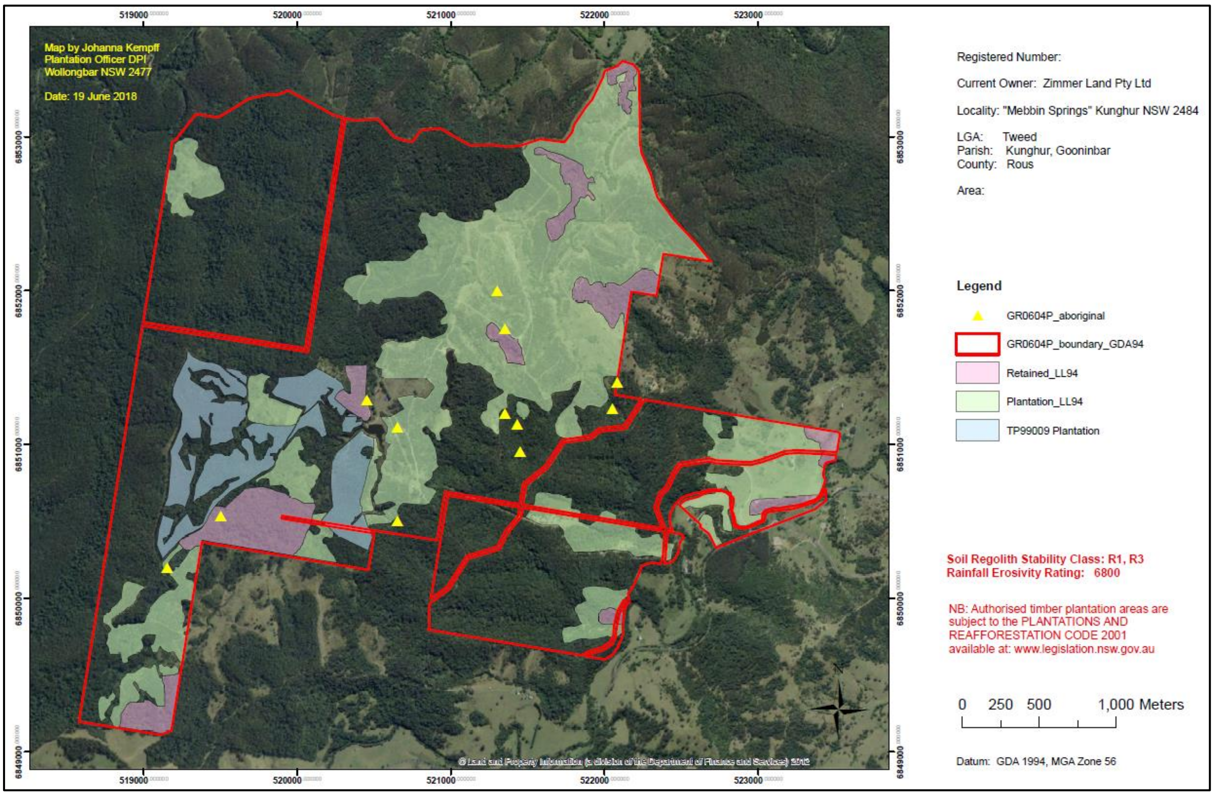

Map by Johanna Kempff
Plantation Officer DPI
Wollongbar NSW 2477
Date: 19 June 2018
519000
520000
521000
522000
523000
6853000
6852000
6851000
6850000
6849000
Registered Number:
Current Owner: Zimmer Land Pty Ltd
Locality: "Mebbin Springs" Kunghur NSW 2484
LGA: Tweed
Parish: Kunghur, Gooninbar
County: Rous
Area:
Legend
GR0604P_aboriginal
GR0604P_boundary_GDA94
Retained_LL94
Plantation_LL94
TP99009 Plantation
Soil Regolith Stability Class: R1, R3
Rainfall Erosivity Rating: 6800
NB: Authorised timber plantation areas are subject to the PLANTATIONS AND REAFFORESTATION CODE 2001 available at: www.legislation.nsw.gov.au
0 250 500 1,000 Meters
Datum: GDA 1994, MGA Zone 56
© Land and Property Information (a division of the Department of Finance and Services) 2012

Figure 3: Plantation Plan Covering Areas of the Subject Site (Prepared by DPI, 2018)

The site contains a portion of land earmarked for potential future dam inundation to meet the Tweed Shire Councils projected water demand to 2046. In light of ongoing discussions and negotiations with Council, the proposal has considered areas 140m AHD and less for potential future inundation of a dam. As such, these areas will remain undeveloped and clear of structures, internal roads and works as part of the concept. The future dam inundation area is illustrated within **Figure 4** below.

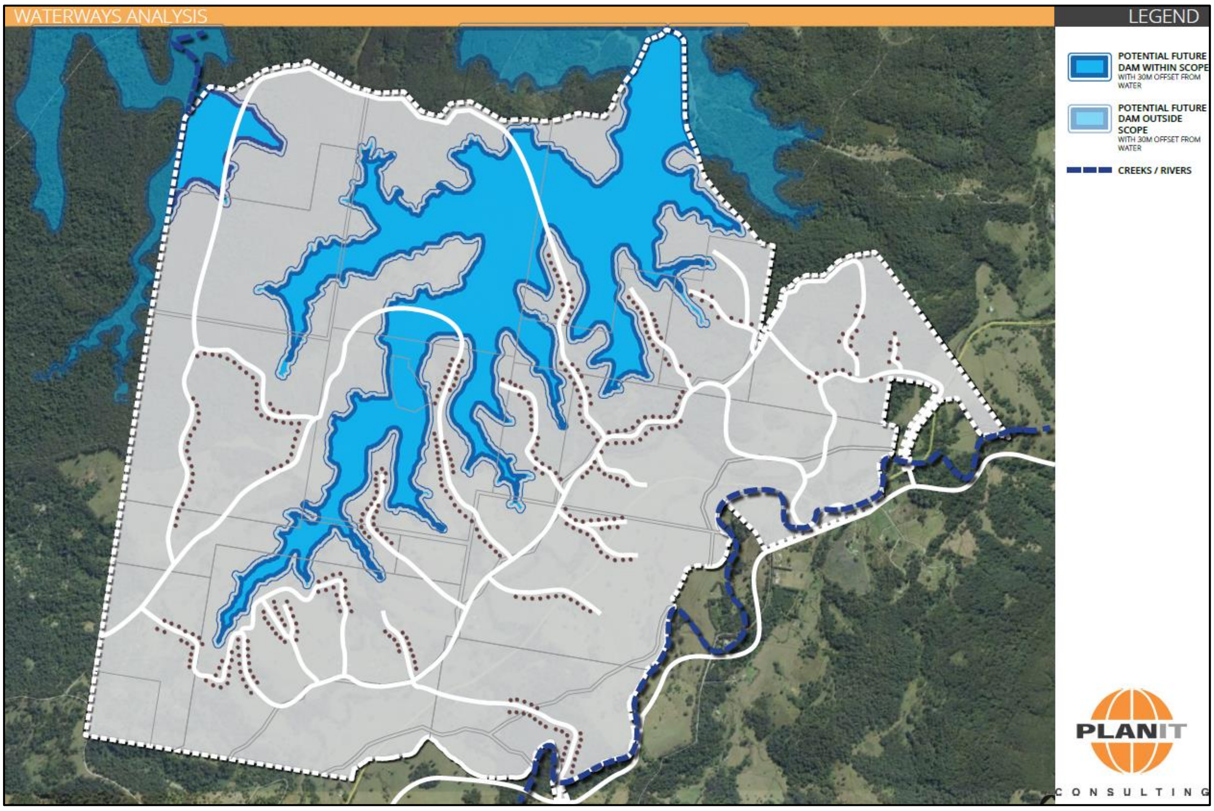

WATERWAYS ANALYSIS
LEGEND
POTENTIAL FUTURE DAM WITHIN SCOPE WITH 30M OFFSET FROM WATER
POTENTIAL FUTURE DAM OUTSIDE SCOPE WITH 30M OFFSET FROM WATER
CREEKS / RIVERS
PLANIT CONSULTING

Figure 4: Potential Dam Inundation Area (Blue)

1.3 Existing Approvals

The following table is a snapshot of the relevant approvals over the subject sites.

Table 2: Site Approval History

Existing Approvals		
Application	**Approval**	**Date**
DA06/1054	Concept Plan Approval for a Village and ancillary development	29/06/2009
D94/0073	Tourist Accommodation (camping ground)	06/05/1994

The subject site had an integrated development approved in 2009 for the concept development of a village and ancillary development (refer to **Figure 5**). The previous approval involved significant development of the site, primarily centred around the RU5 zoned area fronting Kyogle Road. The previous approval provided for Stage 1 works including the internal access to Kyogle Road. The previously approved layout has been generally maintained. As the current status of the village DA remains part of ongoing investigation, its relationship to the proposal is that it remains a zoned and potentially developable key parcel of land for the area.

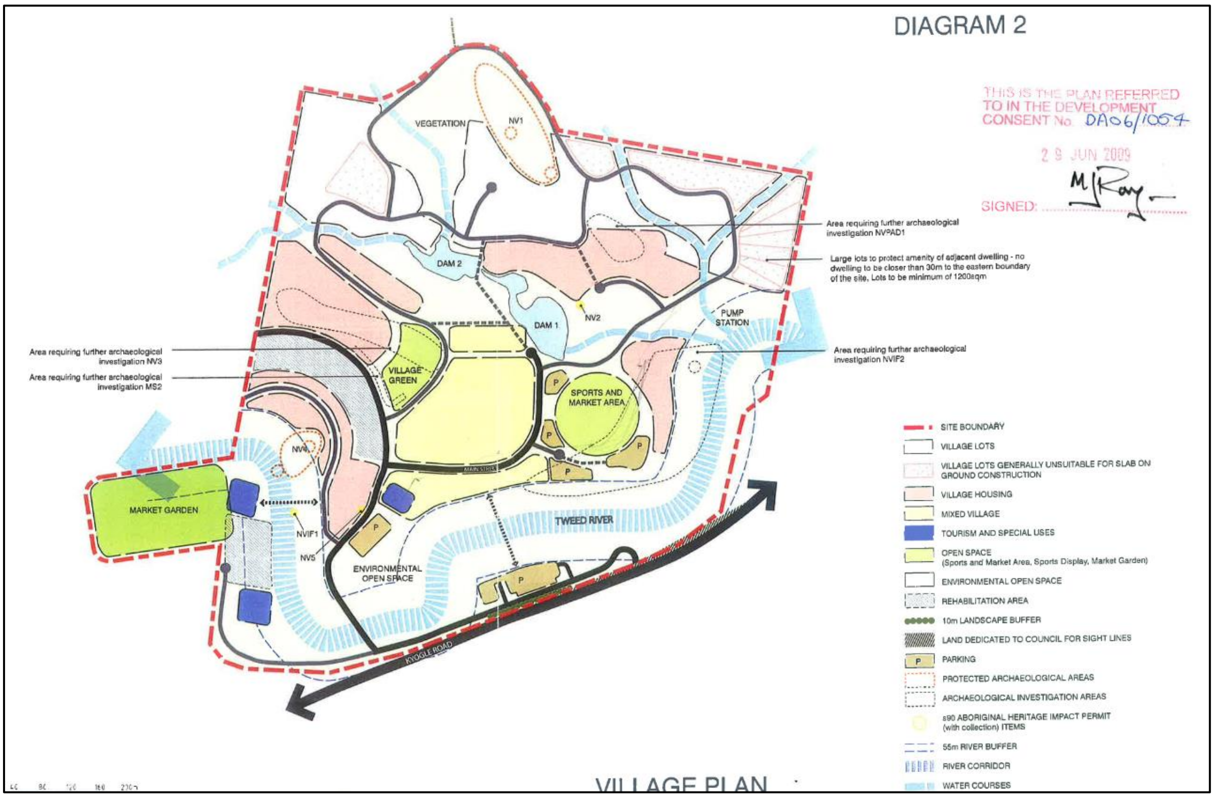


DIAGRAM 2
THIS IS THE PLAN REFERRED TO IN THE DEVELOPMENT CONSENT No. DA06/1054
29 JUN 2009
SIGNED: M J Ray
VEGETATION
NV1
DAM 2
DAM 1
NV2
PUMP STATION
VILLAGE GREEN
SPORTS AND MARKET AREA
MARKET GARDEN
NV6
NVIF1
NV5
ENVIRONMENTAL OPEN SPACE
TWEED RIVER
KYOGLE ROAD
P
Area requiring further archaeological investigation NVPAD1
Large lots to protect amenity of adjacent dwelling - no dwelling to be closer than 30m to the eastern boundary of the site. Lots to be minimum of 1200sqm
Area requiring further archaeological investigation NVIF2
Area requiring further archaeological investigation NV3
Area requiring further archaeological investigation MS2
SITE BOUNDARY
VILLAGE LOTS
VILLAGE LOTS GENERALLY UNSUITABLE FOR SLAB ON GROUND CONSTRUCTION
VILLAGE HOUSING
MIXED VILLAGE
TOURISM AND SPECIAL USES
OPEN SPACE (Sports and Market Area, Sports Display, Market Garden)
ENVIRONMENTAL OPEN SPACE
REHABILITATION AREA
10m LANDSCAPE BUFFER
LAND DEDICATED TO COUNCIL FOR SIGHT LINES
PARKING
PROTECTED ARCHAEOLOGICAL AREAS
ARCHAEOLOGICAL INVESTIGATION AREAS
s90 ABORIGINAL HERITAGE IMPACT PERMIT (with collection) ITEMS
55m RIVER BUFFER
RIVER CORRIDOR
WATER COURSES
VILLAGE PLAN

Figure 5: Previous Concept Plan Approval

Tourist accommodation was approved in 1995 and remains operational over one (1) lot in the north-east of the site. No alteration to this existing operation is proposed.

1.4 Proposal Description

The proposal represents a carefully considered, master planned approach for the site to meet an increasing demand for affordable and diverse housing. Overall, the Concept Plan and framework will facilitate the future development of 10 x interconnected RLSCs spread amongst 1584ha of the Tweed Coast Hinterland. Up to 392 x dwellings will be provided across these 10 x RLSCs, along with all roads, essential services, community facilities, recreational spaces, cultural appreciation areas and ecological rehabilitation areas.

Each of the 10 x RLSC lots accommodates between 9 x and 62 x dwellings based on the lot size, constraints, developable area and allowable dwelling density under the *State Environmental Planning Policy (Primary Production and Rural Development) 2019*. The projected population will range between 750 – 1,000 and considers outcomes of single occupier homes, Tweed Shire Council's typical 2.4 x persons per dwelling generation rate and the allowable maximum population specified under the *State Environmental Planning Policy (Primary Production and Rural Development) 2019*.

This subject Development Application (DA) is made under Section 4.22(1) of the *Environmental Planning & Assessment Act 1979* (the Act) and sets out the proposed Concept Plan for developing the site for RLSCs.

Despite being permissible at the site in accordance with *State Environmental Planning Policy (Primary Production and Rural Development) 2019,* a Concept Plan is being pursued to seek endorsement for this expansive undertaking and coordinate its delivery through multiple future Development Applications.

This subject DA does set out in detail the first stage of development, which comprises roads and earthworks.

To summarise, the subject DA comprises:

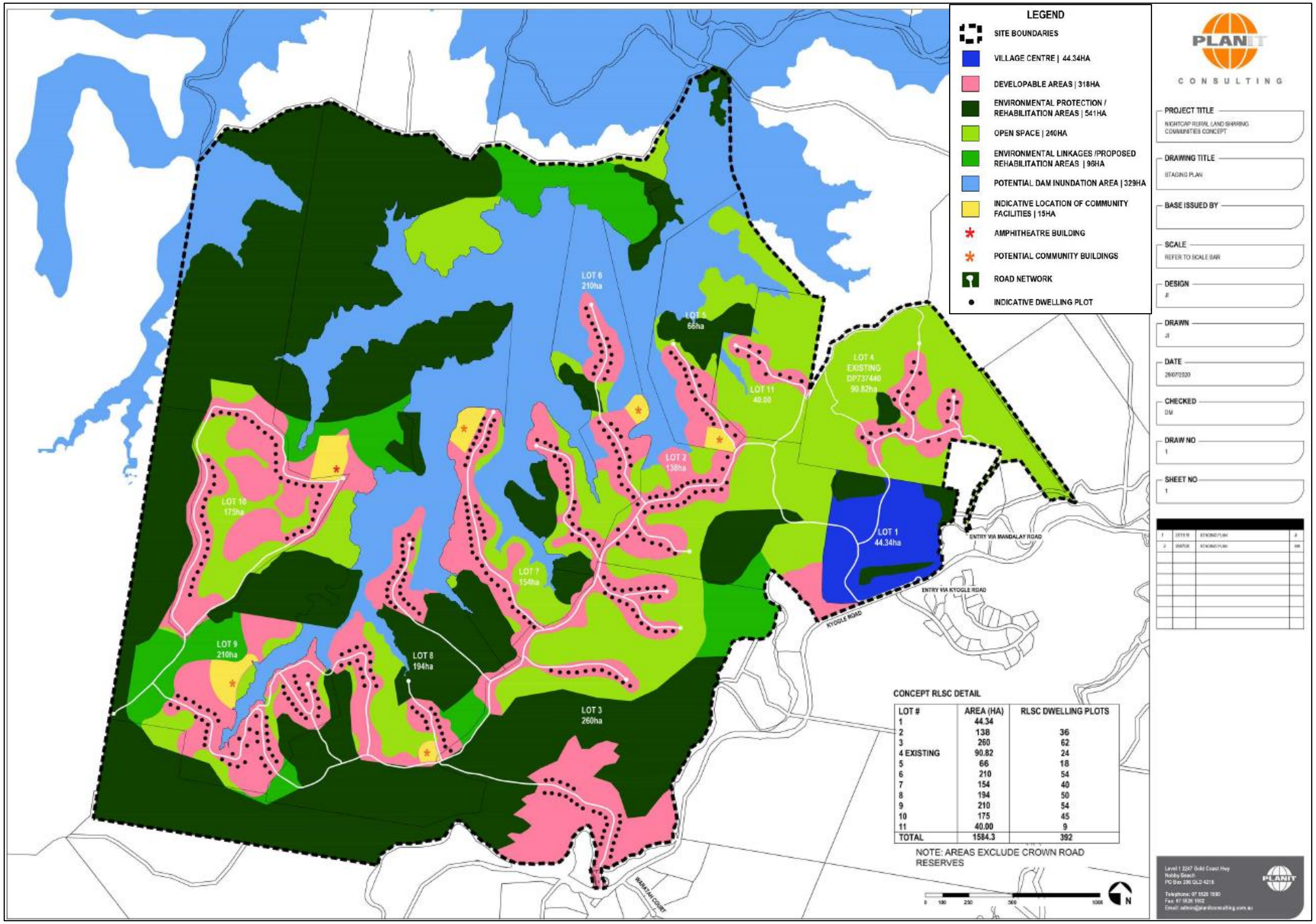
- **Concept Proposal for 10x RLSCs; and**
- **Stage 1: Private Road Works and Earthworks**
    - To upgrade the access to Kyogle Road (opposite Mebbin Drive)
        - Earthworks
        - Vegetation removal
        - Rehabilitation works

In accordance with Division 4.4 of the Act, subsequent DAs for stages 2-12 will seek approval to subdivide the site and establish the RLSCs.

- ***Future Stage 2: Subdivision and Associated works***
    - *Subdivision creating 11 Torrens lots*
        - Earthworks
        - Vegetation removal
        - Vegetation protection/regeneration
        - Private Road works and access to Kyogle Road
        - Servicing strategy (ie. waste, resource recovery, recycled water, etc.)
        - Telecommunication and electrical connection

- ***Future Stages 3-12: RLSCs***
    - *Detailed design and allocation of dwelling plots*
    - *Community infrastructure (community facilities, roads, services, etc)*
    - *Plot preparation and essential infrastructure connection*
        - Earthworks
        - Vegetation removal
        - Vegetation protection/regeneration

The proposed concept plan is provided within **Figure 6** below.


LEGEND
SITE BOUNDARIES
VILLAGE CENTRE | 44.34HA
DEVELOPABLE AREAS | 318HA
ENVIRONMENTAL PROTECTION / REHABILITATION AREAS | 541HA
OPEN SPACE | 240HA
ENVIRONMENTAL LINKAGES /PROPOSED REHABILITATION AREAS | 96HA
POTENTIAL DAM INUNDATION AREA | 329HA
INDICATIVE LOCATION OF COMMUNITY FACILITIES | 15HA
AMPHITHEATRE BUILDING
POTENTIAL COMMUNITY BUILDINGS
ROAD NETWORK
INDICATIVE DWELLING PLOT
LOT 1 44.34ha
LOT 2 138ha
LOT 3 260ha
LOT 4 EXISTING DP737440 90.82ha
LOT 5 66ha
LOT 6 210ha
LOT 7 154ha
LOT 8 194ha
LOT 9 210ha
LOT 10 175ha
LOT 11 40.00
ENTRY VIA MANDALAY ROAD
ENTRY VIA KYOGLE ROAD
KYOGLE ROAD
WARATAH COURT
0
100
250
500
1000
N
CONSULTING
PROJECT TITLE
NIGHTCAP RURAL LAND SHARING COMMUNITIES CONCEPT
DRAWING TITLE
STAGING PLAN
BASE ISSUED BY
SCALE
REFER TO SCALE BAR
DESIGN
JI
DRAWN
JI
DATE
29/07/2020
CHECKED
DM
DRAW NO
1
SHEET NO
1
STAGING PLAN
STAGING PLAN
Level 1 2247 Gold Coast Hwy
Nobby Beach
PO Box 206 QLD 4218
Telephone: 07 5526 1500
Fax: 07 5526 1502
Email: admin@planitconsulting.com.au
PLANIT

CONCEPT RLSC DETAIL

LOT #	AREA (HA)	RLSC DWELLING PLOTS
1	44.34	
2	138	36
3	260	62
4 EXISTING	90.82	24
5	66	18
6	210	54
7	154	40
8	194	50
9	210	54
10	175	45
11	40.00	9
TOTAL	1584.3	392

NOTE: AREAS EXCLUDE CROWN ROAD RESERVES

Figure 6: Proposed Concept Plan

1.5 Biodiversity Offset Scheme

The *Biodiversity Conservation Act 2016*, together with the *Biodiversity Conservation Regulation 2017*, outlines the framework for addressing impacts on biodiversity from development and clearing. It establishes a framework to avoid, minimise and offset impacts on biodiversity from development through the Biodiversity Offsets Scheme (BOS).

The Biodiversity Offsets Scheme creates a transparent, consistent and scientifically based approach to biodiversity assessment and offsetting for all types of development that are likely to have a significant impact on biodiversity. It also establishes biodiversity stewardship agreements, which are voluntary in-perpetuity agreements entered into by landholders, to secure offset sites.

The Scheme applies to:

- Local development (assessed under Part 4 of the *Environmental Planning and Assessment Act 1979*) that is likely to significantly affect threatened species or triggers the Biodiversity Offsets Scheme threshold.
- State significant development and state significant infrastructure projects, unless the Secretary of the Department of Planning and Environment and the Chief Executive of OEH determine that the project is not likely to have a significant impact
- Biodiversity certification proposals
- Clearing of native vegetation in urban areas and areas zoned for environmental conservation that exceeds the Biodiversity Offsets Scheme threshold and does not require development consent
- Clearing of native vegetation that requires approval by the Native Vegetation Panel under the *Local Land Services Act 2016*
- Activities assessed and determined under Part 5 of the *Environmental Planning and Assessment Act 1979* (generally, proposals by government entities), if proponents choose to 'opt in' to the Scheme.

The Biodiversity Offsets Scheme Threshold is a test used to determine when is necessary to engage an accredited assessor to apply the Biodiversity Assessment Method (the BAM) to assess the impacts of a proposal.

It is used for local developments (development applications submitted to councils) and clearing that does not require development consent in urban areas and areas zoned for environmental conservation (under the *State Environmental Planning Policy (Vegetation in Non-Rural Areas) 2017*).

The *Biodiversity Conservation Regulation 2017* sets out threshold levels for when the Biodiversity Offsets Scheme will be triggered. The threshold has two elements:

- whether the amount of native vegetation being cleared exceeds a threshold area set out below
- whether the impacts occur on an area mapped on the Biodiversity Values map published by the Minister for the Environment.

If clearing and other impacts exceeds either trigger, the Biodiversity Offset Scheme applies to the proposed development including biodiversity impacts prescribed by clause 6.1 of the *Biodiversity Regulation 2017*.

Biodiversity Values Map Threshold

The Biodiversity Values Map identifies land with high biodiversity value, as defined by clause 7.3(3) of the *Biodiversity Conservation Regulation 2017*. The Biodiversity Offsets Scheme applies to all clearing of native vegetation and other biodiversity impacts prescribed by clause 6.1 of the *Biodiversity Regulation 2017* on land identified on the map.

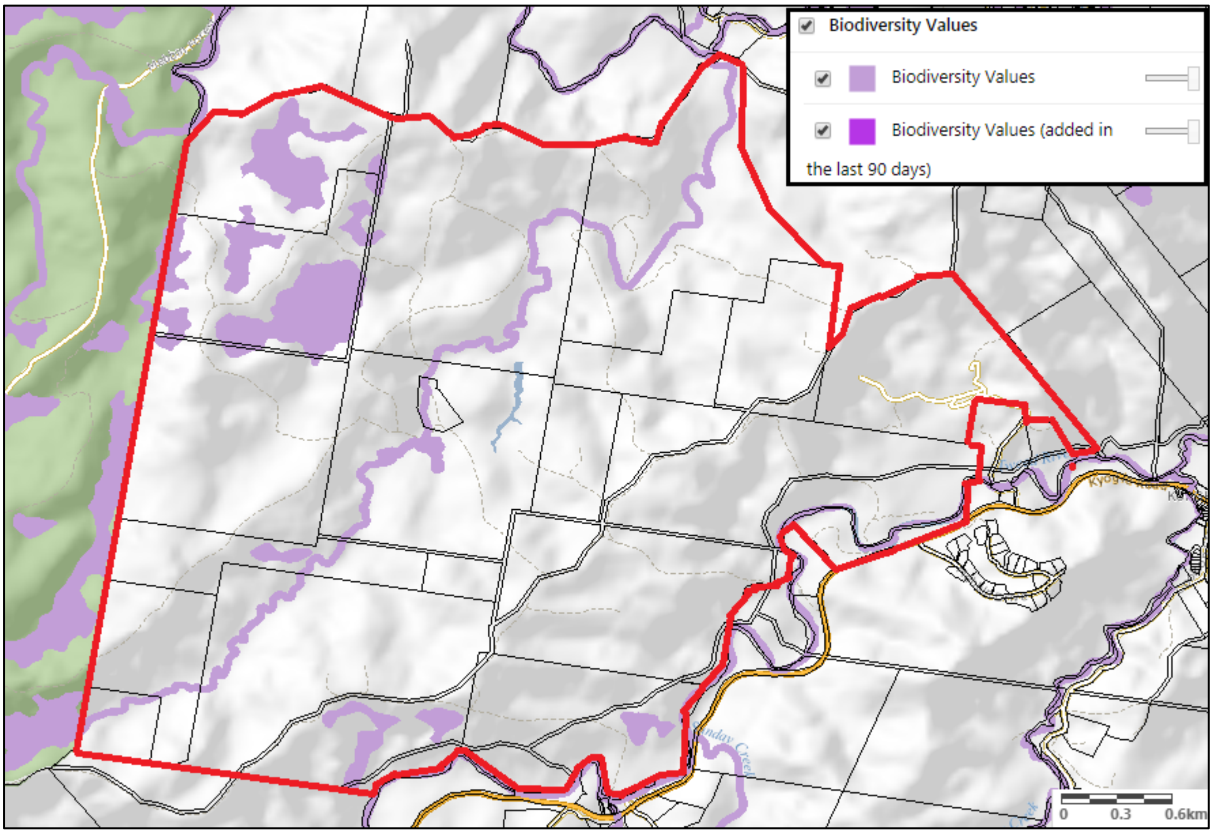
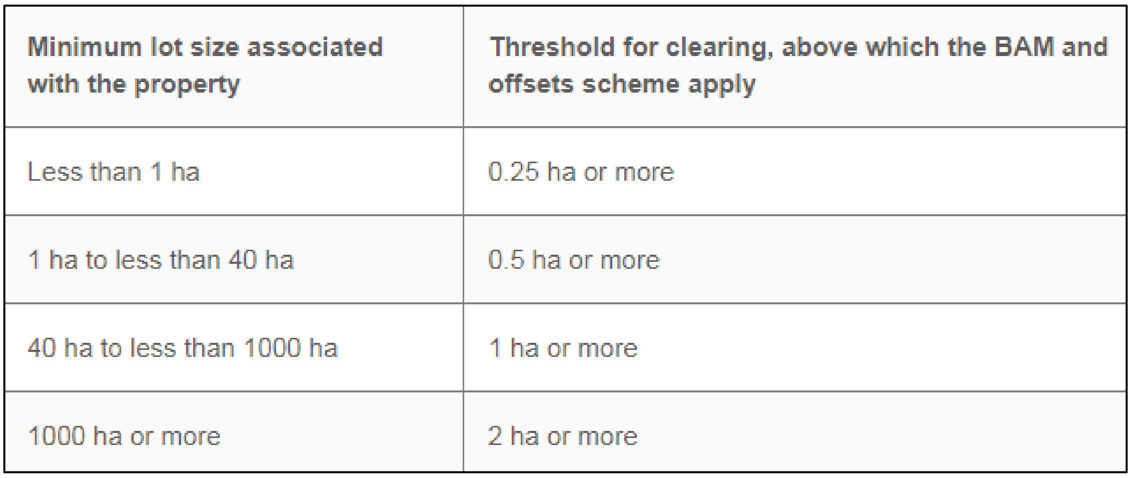


Figure 7: Biodiversity Values Map with the Subject Site Outlined Red

Reviewing the Biodiversity Values Map (refer to **Figure 7**) for the proposal site, numerous areas of mapped biodiversity values occur within the proposal footprint.

Area Clearing Threshold

The area threshold varies depending on the minimum lot size (shown in the Lot Size Maps made under the relevant Local Environmental Plan (LEP)), or actual lot size (where there is no minimum lot size provided for the relevant land under the LEP).



Minimum lot size associated with the property	Threshold for clearing, above which the BAM and offsets scheme apply
Less than 1 ha	0.25 ha or more
1 ha to less than 40 ha	0.5 ha or more
40 ha to less than 1000 ha	1 ha or more
1000 ha or more	2 ha or more

Figure 8: BOS Area Clearing Threshold

The area threshold applies to all proposed native vegetation clearing associated with a proposal, regardless of whether this clearing is across multiple lots. In the case of a subdivision, the proposed clearing must include all future clearing likely to be required for the intended use of the land after it is subdivided / developed.

Reviewing the *Tweed Local Environmental Plan (2014*), the minimum Lot size over the subject site is 40ha. Reviewing the BOS area clearing threshold, it is noted that threshold for native vegetation clearing is 1ha or more.

The proposal requires the removal of approximately 106.58ha of native vegetation (refer to **Section 5.2** for more details). As the native vegetation clearing area exceeds the threshold for clearing, and areas of development footprint occurs within mapped Biodiversity Value areas, a BAM assessment will ultimately be required for the proposed development.

1.6 Purpose of the Report

The Biodiversity Development Assessment Report (BDAR) has been prepared in accordance with the NSW Biodiversity Assessment Method (BAM) and provides findings of the Biodiversity Assessment of the proposal site. It addresses specific requirements of the BAM which applies to the project such as:

- Outline the methods used to identify the biodiversity values within the proposal site;
- Determine and describe the existing flora, vegetation communities, fauna assemblage and associated habitats of the study area and adjoining areas, including:
    - The presence of native vegetation and its integrity;
    - The presence and extent of each Plant Community Type (PCT) within the site;
    - The presence of flora and fauna species, and the extent of their habitats within the site;
    - The presence of any threatened species, populations and/or ecological communities scheduled under the *Biodiversity Conservation Act 2016;* and
    - Methodologies of flora and fauna surveys of the site.
- Assess and describe the potential impacts of the proposal on existing terrestrial ecological values of the site;
- Propose amelioration measures to avoid and/or mitigate potential impacts upon the ecological values of the study area; and

- Determine and calculate any biodiversity offsets for the project as per the requirement of BAM.

1.7 Resources, Documents and Policies

The following resources, documents and policies were utilised during the preparation of this BDAR for the proposal:

- Biodiversity Assessment Method (2017)
- Biodiversity Assessment Calculator
- Survey Guidelines for Australia's Threatened Mammals (DEWHA, 2011)
- Survey Guidelines for Australia's Threatened Birds (DEWHA, 2010)
- Threatened Species Survey and Assessment Guidelines: Field Survey Methods for Fauna. Amphibians (DECC, 2009).
- Threatened Biodiversity Survey and Assessment: Guidelines for Developments and Activities Working Draft (DEC, 2004)
- NSW Guide to Surveying Threatened Plants (OEH, 2016)
- *Biodiversity Conservation Act 2016*
- *Biodiversity Conservation Regulation 2017*
- *Environment Protection and Biodiversity Conservation Act 1999*
- BioNet Atlas of NSW Wildlife database and mapping tool (OEH, 2019b), accessed November 2017, March 2019 and December 2019
- Threatened Biodiversity Data Collection (TBDC)
- Vegetation Information System (VIS) Classification Data (OEH, 2019b), accessed March 2018, March 2019 and December 2019
- Protected Matters Search Tool (PMST) (DoEE, 2019a), accessed November 2017, March 2019 and December 2019
- Google Earth and Six maps (Aerial Photos)
- Sharing and Enabling Environmental Data (SEED)
- Tweed Shire Council Environment Mapping

1.8 Contributors

The roles of all personnel who contributed in the preparation of this BDAR are listed within **Table 3** below:

Table 3: Report Contributors

Name	BAM Assessor ID	Role
Tomy Rados *Ecologist / Environmental Planner at Planit*	BAAS18025	BDAR Preparation Field Surveys Technical Direction BAM Calculator Application
Boyd Sargeant *Director at Planit*	BAAS18035	Field Surveys Quality Assurance Review
Graham Dart *Senior Ecologist / Environmental Planner at Planit*	BAAS19041	Field Surveys
Laura Thorley *Environmental Planner at Planit*		Field Surveys
James Bailey *Environmental Planner at Planit*	-	Field Surveys

Name	BAM Assessor ID	Role
Jamie Webb *Coordinator Design Production at Planit*	-	Preparation of Maps and Plans
Glenn Hoye *Fly by Night Bat Surveys*	-	Bat Call Analysis
Georgeanna Story *Scats About*	-	Hair Funnel and Scat Analysis

1.9 Relevant Licences

The following issued licences are held by the surveyors:

Table 4: Relevant Survey Licences

Authority	Licence/Permit	Title	Expiration	Permit No.
NSW DPI Animal Care & Ethics Committee	Animal Research Approval	Fauna Surveying, Trapping & Release	30 June 2023	TRIM 14/1971
NSW DPI Animal Care & Ethics Committee	Animal Research Authority	Fauna Surveying, Trapping & Release	30 June 2021	TRIM 14/1971
NSW National Parks & Wildlife Service	Scientific Licence	Ecological Survey	31 July 2021	SL100142

1.10 Definitions, Terminology and Nomenclature

For the purposes of this flora and fauna assessment the following definitions apply:

Subject Site / Site: refers to the extent of the lands forming the boundaries of this development application as described in **Section 1.2** and illustrated within **Figure 1**.

Development Footprint / Development Site: refers to those areas of the site which will be directly impacted on by the proposal (i.e. the residential areas, Bushfire APZ, roads, clearing areas).

Study Area: refers to the Subject Site buffered by approximately 50m.

TEC: denotes a Threatened Ecological Community as defined within the *Biodiversity Conservation Act 2016*.

BDAR: refers to Biodiversity Development Assessment Report.

BAM: refers to Biodiversity Assessment Method.

SAII: refers to Serious and Irreversible Impact as defined within the Biodiversity Conservation Act 2016.

Additional terminology associated with significance assessments (i.e. threatened species, populations, communities, threatening process, direct impacts, indirect impacts etc.) and the factors of such assessments (i.e. test of significance) are taken to be those existing within the *Biodiversity Conservation Act 2016*, *Environmental Planning and Assessment Act 1979*, and OEH documents entitled *Guidance to assist a decision-maker to determine a serious and irreversible impact* (OEH 2017) and *Threatened*

Species Test of Significance Guidelines (OEH 2018). Additional terms within the report which warrant the source of the definition have been specifically referenced in the text.

Nomenclature for all plant species contained within this document follow Harden (1992, 1993, 2000 & 2003) The Flora of NSW Volumes 1-4. Scientific names for plants are used primarily in the document to avoid any confusion associated with use of common or descriptive plant names.

Nomenclature for all animal species contained within this document follows those utilised by the Office of Environment and Heritage/National Parks and Wildlife Service (2020) in association with the Atlas of NSW Wildlife. Scientific names for fauna are used primarily in the document to avoid any confusion associated with use of common or descriptive animal names.

2 Landscape Context

2.1 Identify Landscape Features

In accordance with the BAM, a number of features are assessed within and surrounding the subject site. Provided below are details related to IBRA region and subregion and NSW landscape regions (Mitchell Landscapes). Other features, such as rivers, streams, estuaries, wetlands, habitat connectivity, areas of geological significance, or areas of outstanding biodiversity value are considered where appropriate.

2.1.1 IBRA Regions and Subregions

The subject site occurs within the following Interim Biogeographic Regionalisation of Australia (IBRA) region and subregion (as shown within **Figure 10**):

Table 5: IBRA Region and Subregion

IBRA Region	South East Queensland
IBRA Subregion	Scenic Rim

2.1.2 NSW Landscape

The subject site occurs in two NSW Landscape (Mitchell Landscape), being the Mount Warning Exhumed Slopes over the majority of the site, and Mount Warning Plugs occurring in the north-eastern sections of the subject site. A description of these Landscapes is provided below (DECC, 2002):

Table 6: NSW Landscape Description

NSW Landscape	Description
Mount Warning Exhumed Slopes	Moderately steep hills and ridges with central drainage to the Tweed River formed on the slopes of a pre-Tertiary landscape exposed by erosion of the Lamington volcanics. SilurianDevonian greywacke, slate, phyllite and quartzite, Triassic rhyolite, tuff and claystone and Jurassic shale sandstone and coal. General elevation 25 to 300m, local relief 125m. Shallow structured and friable red and brown loam and clay loam gradational profiles. Subtropical and tropical closed forest of; white booyong (Argyrodendron trifoliolatum), native teak (Flindersia australis), pigeonberry ash (Cryptocarya erythroxylon), ball nut (Floydia praealta), ferny-leaf bosistoa (Bosistoa pentacocca), union nut (Bouchardatia neurococca), doughwood (Melicope octandra), crow's ash (Pentaceras australis), red lilly pilly (Syzygium hodgkinsoniae) and numerous vines. Marginal areas of; tallow wood (Eucalyptus microcorys), Sydney blue gum (Eucalyptus saligna), red bloodwood (Corymbia gummifera), turpentine (Syncarpia glomulifera), brush box (Lophostemon confertus) and blackwood (Acacia melanoxylon).
Mount Warning Plugs	High, steep peak of the central plug of the Tertiary Mt Warning/Lamington volcanic complex of; basalt, trachyte, gabbro, syenite and rhyolite. Radial drainage of the central peak and a prominent cliff line around the plug in columnar jointed rhyolite. General elevation 300 to 1160m, local relief 750m. Considerable rock outcrop and thin stony brown loam. Deeper organic rich structured loam in the rubbly debris slope with subtropical closed forest of; white booyong (Argyrodendron trifoliolatum), red carabeen (Geissois benthamii), yellow carabeen (Sloanea woollsii), red cedar (Toona australis), bangalow palms (Archontophoenix cunninghamiana), giant stinging tree (Dendrocnide excelsa), flame tree (Brachychiton acerifolius) and Ficus sp. on the rocky cliff face.

2.1.3 Geology and Soils

The site has been mapped by eSPADE as containing the following five soil types:

- Byrrill (by);
- Kunghur (ku);
- Oxley (ox);
- Mount Terragon (mt); and
- Calico (cl).

These areas are described in more detail within 'Soil Landscapes of the Murwillumbah Tweed Heads' (Morland, 1996):

- Byrrill (by): occurs over the western portions of the site.

Location: Rolling hills occupying the western area of the Tweed Caldera. Occupies much of the area between the Border Ranges and Mount Warning, extending from the south of the sheet to just north of Tyalgum.
Geology: Walloon Coal Measures (Jurassic): mixed rock types including volcanolithic sandstone, carbonaceous siltstone, shale and mudstone, coal, bentonitic siltstone (altered volcanic ash) and minor oil shale; clayey ironstone, weathering to ironstone concretions, is common (Wells and O'Brien 1994b). Intrusions by Tertiary dykes and sills are also common (Wells and O'Brien 1994b).

Topography: Rolling low hills and hills. Slopes range from 10–25% but can be up to 50%. Relief is 60–120 m and elevation is 200–230 m. Very long (1 000–3 000 m) ridges and spurs are characteristic. Slope shapes are generally complex, but ridge slopes tend to be waxing and sideslopes are simple and moderately long (200–500 m). Crests and ridges are narrow to moderately broad (50–150 m). Drainage is erosional, tributary and convergent.
Soils: shallow to moderately deep (60–100 cm), moderately well-drained Red Podzolic Soils (Dr2.11) on sandstone; deep (>150 cm), moderately well-drained Brown Clays (Gn3.71) in areas adjoining basalt; deep (>100 cm), moderately well-drained Red Podzolic Soils (Dr3.11, Db2.11) and moderately deep (70–100 cm), moderately well-drained Greybrown Podzolic Soils (Db1.41) on shale/siltstone; deep (>100 cm), well-drained Krasnozems (Um6.13, Uf5) and Red Earths (Um5.52, Uf6.71) on ironstone; shallow to moderately deep (100 cm), moderately well-drained Dark Podzolic Soils (Dd2.11) on carbonaceous shale.

- Kunghur (ku): occurs in the eastern portions of the site.

Location: Moderately inclined hills on Bundamba Group sediments within the Tweed Caldera. Occurs predominantly on the south of the sheet in the Kunghur area, but is also present near Numinbah and Chillingham.
Geology: Bundamba Group (Triassic–Jurassic)—sandstone, siltstone, claystone, conglomerate.
Topography: Undulating and rolling hills. Relief is 100–150 m and slopes are 5–30%. Elevation is 100–300 m. Slopes are long (500–800 m) and waning. Ridges are generally convex and narrow (50–100 m), though in many instances ridge tops form moderately broad (250–300 m), level crests. Rock outcrop is common along ridges and upper slopes. These usually form discontinuous sandstone cliffs, 10–20 m high, flanked by fallen blocks and boulders. Drainage is erosional, tributary and integrated. Streams generally occupy V-shaped valleys.
Soils: shallow to deep (50–>150 cm), well-drained Yellow Podzolic Soils (Dy5.61, Dy3.81) on ridges and upper slopes. Deep (>100 cm), moderately welldrained Yellow Podzolic Soils (Dy5.21), Red Podzolic Soils (Dr5.21, Gn3.14, Gn2.14) and Red Earths (Uf6.71) on slopes. Moderately deep (100–150 cm), poorly drained Gleyed Podzolic Soils (Dg4.11, Dg4.21) and Yellow Podzolic Soils (Dy5.11, Dy5.21) on lower slopes and poorly drained areas.

- Oxley (ox): small area occurring proximate to the Outward Bound Centre.

Location: Level to gently undulating alluvial plains of the mid Oxley River catchment and the mid sections of the Tweed River.
Geology: Deep Quaternary alluvium—mainly clay, sand, gravel and silt. Sediments are derived from various lithologies including basalts, metasediments, rhyolites, gabbro, dolerite, sandstone, siltstone, coal and shales.
Topography: Level to gently undulating narrow to broad (250 – 1 000 m) alluvial plains. Plain width increases with distance downstream. Elevation ranges from 20 m upstream to 5 m in downstream locations. Local relief is generally <9m and is created by the existence of discontinuous terraces and scours. Slopes are <2%, though terrace scarps can be 30-40%. Where the Oxley and Tweed Rivers incise the narrow spine of the Chillingham Volcanics (i.e. Frogs Hollow (fh) soil landscape), the alluvial plain is very narrow or absent. Small bar plains are common within channels in the upper reaches of this soil landscape. Streams are alluvial, tributary and integrated.
Soils: shallow to moderately deep (up to 100 cm), imperfectly drained Alluvial Soils and/or minimal Prairie Soils (Um5.51) on floodplain/bar plain. Deep (>200 cm), moderately well-drained minimal Prairie Soils and dark Alluvial Clays (Uf6.32, Uf6.31, Um6.41) on alluvial plain.

- Mount Terragon (mt): occurs in the north-eastern portion of the site.

Location: A small area of high hills dominated by Mount Terragon.
Geology: Mount Warning Central Complex (Tertiary)—dolerite and basalt. This area is considered by Chesnut (1975) to be a body of sills intruding the sandstones of the Triassic Jurassic Bundamba Group. Numerous individual sills associated with Mount Terragon are exposed throughout the vicinity, extending

into surrounding soil landscapes. These may consist of basalt, dolerite, rhyolite or granophyre (Chesnut 1975).
Topography: Moderately inclined to very steep high hills. Relief is 150–300 m and slope angles are 20–50% or steeper. Elevation of Mount Terragon is 350 m. Slope lengths are long (1 000– 1 500 m along ridges and 750–1 000 m along sideslopes). Slope shape is generally simple, but long ridgeslopes are waning. Streams are erosional, predominantly nontributary and are centrifugal. Rock outcrop, usually as low (2–5 m) dolerite cliffs, occurs sporadically throughout the landscape, generally on mid to upper slopes. Sills associated with Mount Terragon have no distinct surface expression though they can be clearly identified in road cuttings.
Soils: Deep (200 cm), moderately well-drained Red Podzolic Soils (Gn3.14) on sideslopes; deep (>100 cm), moderately well-drained Brown Earths or no suitable Group (Gn3.21) on lower slopes; deep (>200 cm), welldrained Krasnozems (Uf5.22) on sills. Moderately deep (100 cm), imperfectly drained Grey-brown Podzolic soils (Db2.31) on sandstone

- Calico (cl): occurs in the southern sections of Bhula Bhula.

Location: Rolling hills occupying the southern part of Tweed Caldera centred around Snake and Sunday Creeks. Type location on this sheet is traversed by Mount Burrell Road.
Geology: Walloon Coal Measures (Jurassic): grey claystones, commonly carbonaceous or with thin coal seams and fine-to mediumgrained, soft, grey lithic sandstones. Concretionary ironstone is common.
Topography: Predominantly low, occasionally high, rolling hills often displaying distinct dip and scarp slopes. Slopes range from 10–25%, with localised steeper areas (up to 60%) on scarp faces. Relief is 60–150 m. Slope lengths are moderately long to long (sideslopes 300–7000 m, ridgeslopes up to 1 000 m) and slopes are generally simple or waning. Crests and ridges are narrow to moderately broad (100–200 m).

Due to the high elevation of the site Acid Sulfate Soils are not expected to be encountered during excavations.

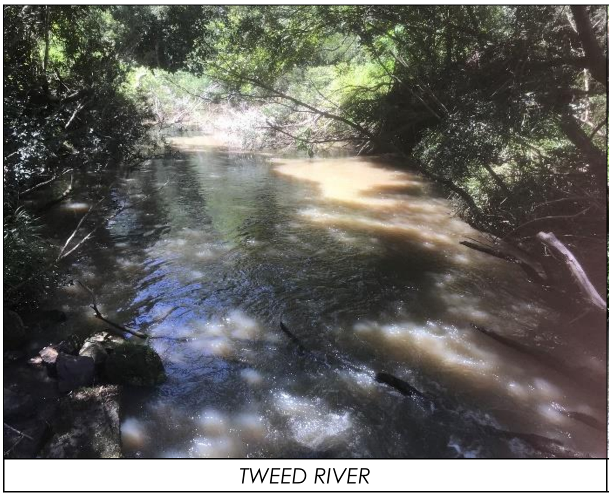
Topographic features of the site include the following:
1. Max RL = 190m AHD approx.
2. Min RL = 100m AHD approx.
3. Maximum grade = 30% approx.

2.1.4 Rivers and Streams

The majority of the subject site is bordered to the south by the Tweed River which comprises of freshwater. As a result of the hilly terrain, the subject site contains numerous smaller unnamed first and second order ephemeral streams which ultimately drains into the site's dams or Tweed River. Kunghurloo Creek traverses the site from Byrrill Creek in the north-eastern corner of the site and exits the site in the south-western corner. The majority of this creek will be subject to inundation by the proposed future dam.

KUNGHURLOO CREEK

UNNAMED EPHEMERAL STREAM WITHIN SUBJECT SITE



TWEED RIVER

TWEED RIVER

2.1.5 Wetlands

The site has not been mapped as containing any wetlands. Site assessment confirmed that no such communities occurs within, or within proximity of the subject site.

Numerous dams and waterbodies occur throughout the subject site which includes man-made farm dams facilitating the agricultural uses of the land. Photos illustrating these areas are provided below.

These dams are external to the development footprint and are unlikely to be significantly impacted upon by the proposal.

The EPBC 'Protected Matters Search' did not identify any Wetlands of National Importance occurring within 10km of the subject site.

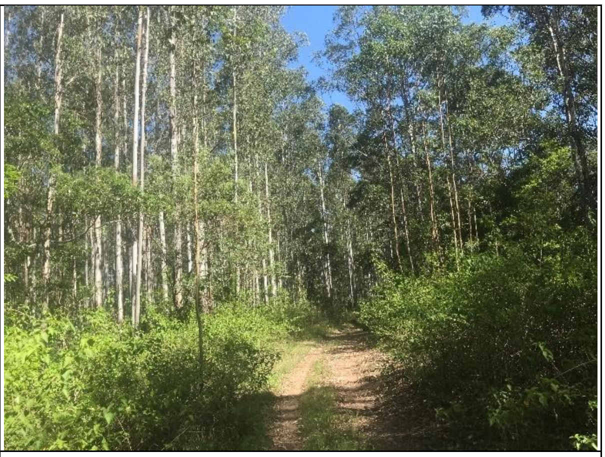
2.1.6 Connectivity Features

Wildlife corridors can be defined as 'retained and/or restored systems of (linear) habitat which, at a minimum enhance connectivity of wildlife populations and may help them overcome the main consequences of habitat fragmentation' (Wilson & Lindenmayer, 1995). Corridors can assist ecological functioning at a variety of spatial and temporal scales from daily foraging movements of individuals, to broad-scale genetic gradients across biogeographical regions (Parsons Brinkerhoff, 2005).

It is noted that areas of the site have been nominated as being located within a 'regional corridor' which links Mebbin National Park to Nightcap National Park (refer to **Figure 9**). Such is connected to Border Ranges National Park and Wollumbin National Park.

The 'regional corridor' occurring through the site traverse significant areas of plantation which are dominated by Lantana (*Lantana camara*) up to 2m in height. These areas provide low ecological values and likely hinders movement opportunities for non-volant fauna species (photos below).

MAPPED REGIONAL CORRIDOR TRAVERSING LANTANA DOMINANT PLANTATION AREAS



MAPPED REGIONAL CORRIDOR TRAVERSING LANTANA DOMINANT PLANTATION AREAS

In addition to this, the proposed future dam inundation area (**Figure 4**) provides a significant barrier for ground-dwelling fauna species that are reluctant to swim. The future dam inundation area entirely dissects the existing mapped 'regional corridor'.

Reviewing the above, it is considered a more suitable location for the 'regional corridor' occurs along the southern portions of the subject site which bypasses the future inundation areas, plantation proposal footprint and eventually re-connects to the existing 'regional corridor' (refer to **Figure 9**). The quality of vegetation within these areas are superior as to those within the existing 'regional corridor' traversing the site (photos below).

RETAINED BUSHLAND WITHIN PROPOSED REGIONAL CORRIDOR

RETAINED BUSHLAND WITHIN PROPOSED REGIONAL CORRIDOR

It is anticipated that these retained areas of the subject site will be incorporated into a biodiversity stewardship site. This stewardship agreement protects and enhances ecological values through implementing management actions (i.e. weed control, pest control, native plantings) over a twenty-year period.

Local fauna movement will be retained with over 800ha of connected native vegetation proposed for retention within the subject site. It is considered that this area is sufficient in size to retain fauna movement opportunities between local habitats. The proposed development footprint targeted existing modified/cleared areas and plantation where possible, retaining more than 80% of the site's native vegetation.

Additionally, the proposed restoration works would provide additional habitat over time to facilitate movements of local fauna. These areas connect the site with neighbouring remnant vegetation and National Parks, allowing fauna movement opportunities across the broader landscape.

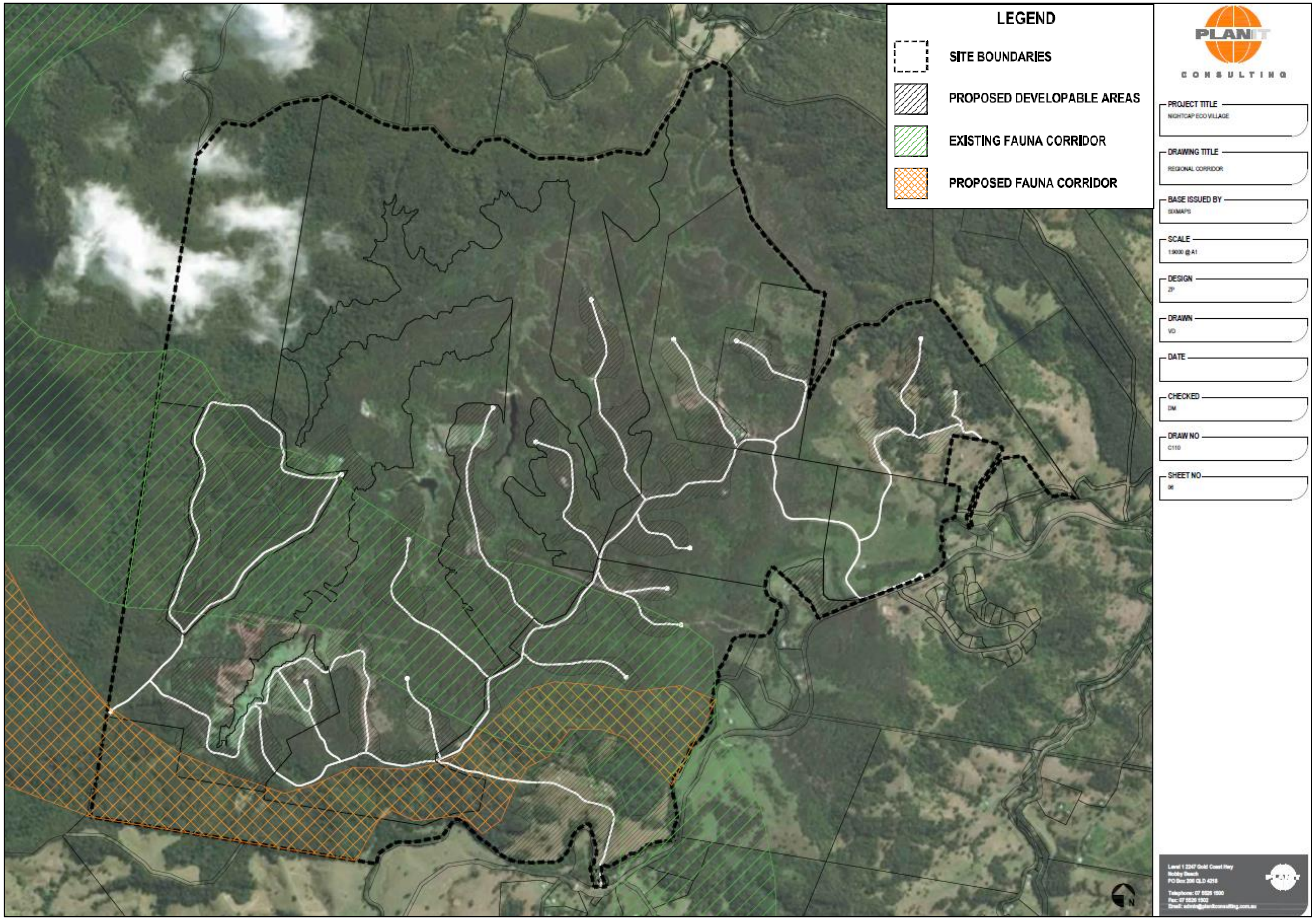

LEGEND
SITE BOUNDARIES
PROPOSED DEVELOPABLE AREAS
EXISTING FAUNA CORRIDOR
PROPOSED FAUNA CORRIDOR
PLANIT
CONSULTING
PROJECT TITLE
NIGHTCAP ECO VILLAGE
DRAWING TITLE
REGIONAL CORRIDOR
BASE ISSUED BY
SIXMAPS
SCALE
1:9000 @ A1
DESIGN
ZP
DRAWN
VD
DATE
CHECKED
DM
DRAW NO
C110
SHEET NO
06
Level 1 2247 Gold Coast Hwy
Nobby Beach
PO Box 206 QLD 4218
Telephone: 07 5526 1500
Fax: 07 5526 1502
Email: admin@planitconsulting.com.au
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Figure 9: Existing and Proposed Regional Corridor

2.1.7 Areas of Geological Significance

The development footprint is not considered to contain any areas of geological significance. No karst, caves, crevices, cliffs or any other areas of geological significance occurs within the development site, or areas immediately surrounding the development site.

A small rocky outcrop occurs in the very northern corner of Lot 5/DP582299 along Kunghurloo Creek which has likely been carved over the years as a result of the watercourse. This area is well removed from the proposed development footprint and will not be impacted upon. No microbat roosting activities were noted during inspections of this area.

Outcrops of embedded rocks and surface rocks were observed in isolated parts across the site in association with watercourses and gullies.

ROCKY OUTCROP NORTH OF LOT 5/DP582299

EXPOSED ROCKS ALONG TWEED RIVER

2.1.8 Areas of Outstanding Biodiversity Value (AOBV)

Areas of Outstanding Biodiversity Value (AOBV) listed under the *Biodiversity Conservation Act 2016* includes:

- Wollemia nobilis (The Wollemi Pine)
- Little Penguin population in Sydney's North Harbour

As the subject site is well removed from the listed AOBVs, it is considered highly unlikely that the proposal will impact the AOBVs.

2.2 Determining the Site Context

The following site context was determined:

2.2.1 Identification of Method Applied

A site-based method was applied for the proposed development and this BDAR.

2.2.2 Percent of Native Vegetation Cover

The extent of native vegetation on the subject site and immediate surrounds was mapped using the Tweed Vegetation Mapping (TSC, 2009), with edits made to the layer where obvious changes to vegetation extent had occurred since the mapping was created.

The total area of the 1500m buffer around the subject site is ~5247ha, with the area of native vegetation mapped within the buffer being ~3148ha. This is a native vegetation cover of ~59.99% falling in the >30-70% class, which was entered into the BAM calculator.

The extent of native vegetation within the subject site and 1500m buffer is depicted within **Table 7** and **Figure 11** below.

Table 7: Native Vegetation Cover

Total area within the 1500m buffer area (ha)	Area of native vegetation within the 1500m buffer area (ha)	Cover within the 1500m buffer area (%)	Vegetation Cover Class
5247	3148	59.99	>30-70%

2.2.3 Assessing Patch Size

A Patch Size is defined as the following within the BAM:

"An area of intact native vegetation that:

- *a) occurs on the development site or biodiversity stewardship site, and*
- *b) includes native vegetation that has a gap of less than 100m from the next area of moderate to good condition native vegetation (or ≤30m for non-woody ecosystems).*

Patch size may extend onto adjoining land that is not part of the development site or biodiversity stewardship site."

Patch size is required to be assessed as one of four classes per vegetation zone mapped, being <5 ha, 5-24 ha, 25-100 ha or >100 ha.

One patch size was identified for native vegetation within the subject site. Native vegetation within the site was located connecting to vegetation extending west into Mebbin National Park, as well as dense remnant bushland to the northeast and southeast of the site. Based on upon vegetation mapping, the total area of this patch of native vegetation was calculated well over 100ha and is therefore within the >100ha class. Vegetation zone names are described in detail within **Section 3** below. The vegetation patch size summary is provided within **Table 8** and illustrated within **Figure 10**.

Table 8: Vegetation Patch Size

Vegetation Zone Name	Patch No.	Area (ha)	Patch Class (ha)
PCT 1073 / Zone 1	1	590.2	>100ha
PCT 812 / Zone 1	1	263.1	>100ha
PCT 812 / Zone 2	1	79.7	>100ha
PCT 1302 / Zone 1	1	5.5	>100ha

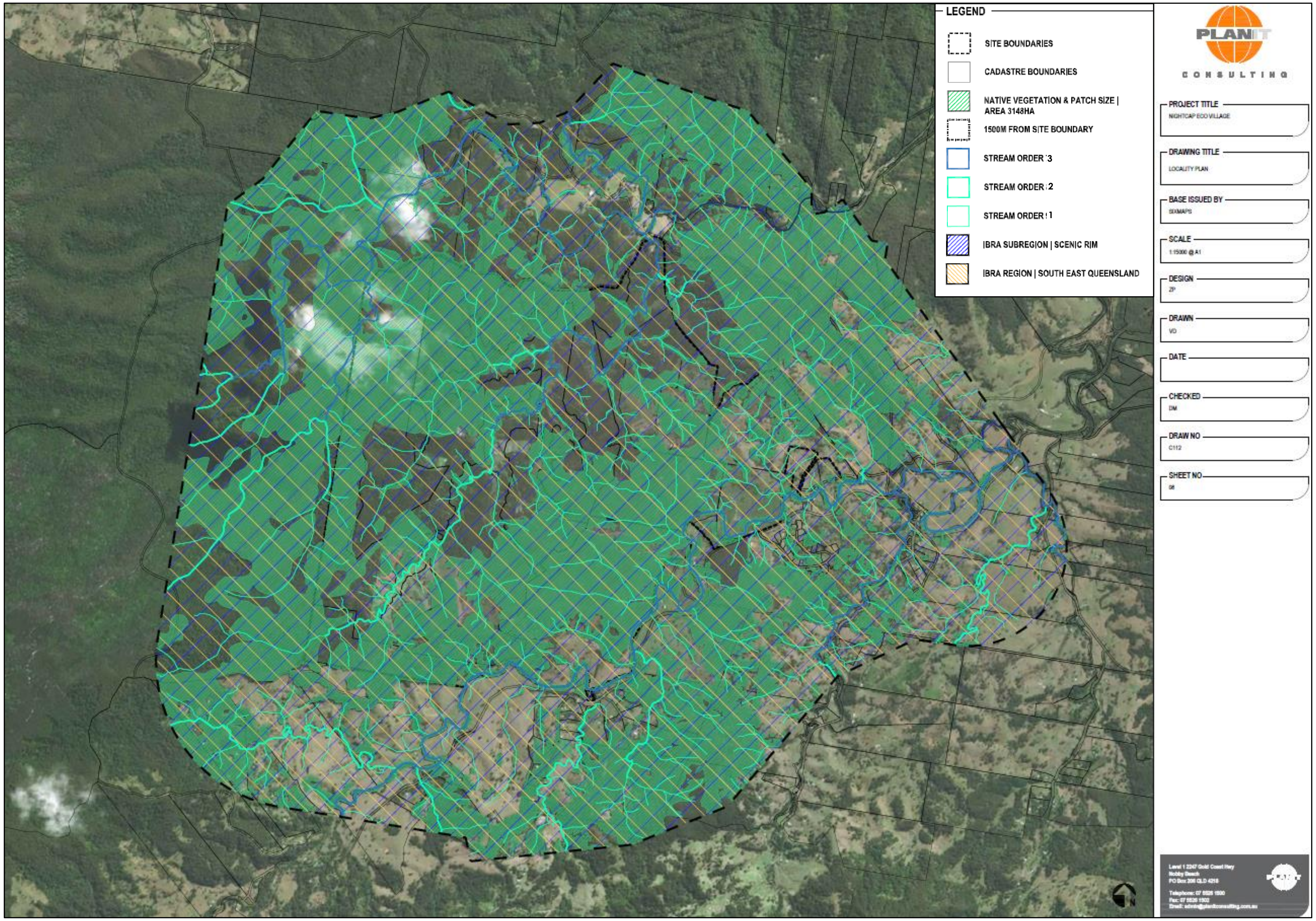
LEGEND
SITE BOUNDARIES
CADASTRE BOUNDARIES
NATIVE VEGETATION & PATCH SIZE | AREA 3148HA
1500M FROM SITE BOUNDARY
STREAM ORDER 3
STREAM ORDER 2
STREAM ORDER 1
IBRA SUBREGION | SCENIC RIM
IBRA REGION | SOUTH EAST QUEENSLAND
PLANIT
CONSULTING
PROJECT TITLE
NIGHTCAP ECO VILLAGE
DRAWING TITLE
LOCALITY PLAN
BASE ISSUED BY
SIXMAPS
SCALE
1:15000 @ A1
DESIGN
ZP
DRAWN
VD
DATE
CHECKED
DM
DRAW NO
C112
SHEET NO
08
Level 1 2247 Gold Coast Hwy
Nobby Beach
PO Box 206 QLD 4218
Telephone: 07 5526 1500
Fax: 07 5526 1502
Email: admin@planitconsulting.com.au
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Figure 10: Locality Plan

3 Native Vegetation

3.1 Vegetation Assessment

Flora assessments were undertaken within the study area in accordance with the Biodiversity Assessment Methodology (BAM) between December 2017 and May 2019 by personnel noted within **Section 1.8**. In determining the vegetation zone boundaries for mapping, aerial imagery, existing vegetation studies and a handheld Garmin Map 62 device was utilised.

In order to identify Plant Community Types (PCTs) within the development site, the assessor must establish survey plots around a central 50m transect as follows:

a) One 400m^2 plot (standard 20m x 20m) is used to assess all of the composition and structure attributes set out in Table 3 of the BAM.

b) One 1000m^2 (standard 20m x 50m) plot is used to assess the function attributes: number of large trees, stem size class, tree regeneration and length of logs

c) Five 1m^2 sub-plots are used to assess average litter cover (and other optional groundcover components) for the plot.

The plot's floristic composition, structure and function data was collected in accordance with Section 5.2 and 5.3 of the BAM.

50M CENTRE LINE OF THE PLOT

1M^2 PLOT ASSESSING LITTER COVER

A total of forty (40) vegetation integrity survey plots were conducted over the subject site in accordance with Section 5.3.4 of the BAM. The locations of these plots are provided within **Figure 11**.

The plot-based floristic vegetation survey is based on a 20m x 20m plot (or 400m^2 equivalent for linear areas) and assess the plot for the information contained within Table 2 of the BAM.

Samples of flora species which were unable to be identified during the site assessment were analysed back in the office with the aid of recognised field guides and botanical keys.

Vegetation conditions of each PCT is required as per the BAM. Vegetation conditions are defined as either being good, moderate or low as presented within **Table 10** below.

Table 9: Vegetation Condition Definitions

Vegetation Condition	Definition
Good	Pristine or nearly so, no obvious signs of disturbance or damage caused by human activities since European settlement.
Moderate	Vegetation retaining a native canopy and has a native understorey of greater than 50% cover. This condition class can include derived native grasslands and can have moderate weed incursions with some patches being subject to grazing or historical logging.
Low	Vegetation within which the understorey is dominated by exotic species being greater than 50% exotic cover. The shrub layer is generally sparse and/or dominated by weeds. Severely impacted by grazing and /or human disturbances.

3.2 Plant Community Types

3.2.1 PCT Descriptions

An analysis of the floristic structure and species composition of the vegetation using the Bionet Vegetation Information System (OEH 2018b) determined that three Plant Community Types (PCTs) are present within the Subject Site:

- Pink Bloodwood – Tallowwood moist open forest of the far northern ranges of the NSW North Coast Bioregion (PCT 1073);
- Dunn's White Gum tall open forest of the ranges of the northern NSW North Coast Bioregion (PCT 812); and
- White Booyong – Fig subtropical rainforest of the NSW North Coast Bioregion (PCT 1302).

In addition to the above PCTs, there are three (3) modified/disturbed communities present within the subject site, as well as areas of open water:

- Plantation;
- Camphor Laurel Dominant Closed to Open Forest;
- Cleared Areas / Grassed Paddocks with Scattered Trees, Regrowth & Weed Thickets; and
- Open Water.

A description of the abovementioned communities is provided below:

Pink Bloodwood – Tallowwood moist open forest of the far northern ranges of the NSW North Coast Bioregion (PCT 1073)

This plant community type occupies the majority of the site and is approximately 576.2ha in area and extends throughout the locality.

The majority of trees within the canopy (20-28m in height) of the mapped area consist of White Mahogany (*Eucalyptus acmenoides*), Tallowwood (*E. microcorys*), Pink Bloodwood (*Corymbia intermedia*), Grey Gum (*E. propinqua*), Northern Grey Ironbark (*E. siderophloia*) and Turpentine (*Syncarpia glomulifera*). Additional lesser occurring canopy species noted include Broad-leaved Mahogany (*E. carnea*), Red Mahogany (*E. resinfera*), Flooded Gum (*E. grandis*), Sydney Blue Gum (*E. saligna*) and Brush Box (*Lophostemon confertus*).

Depending on historical disturbances, a wide variety of shrubs and small trees occurred throughout the community which included (but not limited to) juvenile eucalypts/corymbians previously stated, Wattles (*Acacia irrorata, A. melanoxylon, A. maidenii*), Forest She-Oak (*Allocasuarina torulosa*), Red Ash (*Alphitonia excelsa*), Rose Myrtle (*Archirhodomyrtus beckleri*), Coffee Bush (*Breynia oblongifolia*), Jackwood (*Cryptocarya glaucescens*), Forest Maple (*C. rigida*), Murrogun (*C. microneura*), Narrow-leaved Orangebark (*Denhamia silvestris*), Ribbonwood (*Euroschinus falcatus var. falcatus*), Cheese Tree (*Glochidion ferdinandi*), Guioa (*Guioa semiglauca*), Foambark Tree (*Jagera pseudorhus var. pseudorhus*), Prickly beard-heath (*Leucopogon juniperinus*), Red Kamala (*Mallotus philippensis*), Hairy-leaved Bolly Gum (*Neolitsea dealbata*), Celery Wood (Celery Wood), Purple Pea Bush (*Hovea acutifolia*), Geebung (*Persoonia adenantha*), Scrub Turpentine (*Rhodamnia rubescens*), Scentless Rosewood

(*Synoum glandulosum subsp. glandulosum*), Tree Heath (*Trochocarpa laurina*), Veiny Wilkiea (*Wilkiea huegeliana*) and Sandfly Zieria (*Zieria smithii*).

The ground layer is primarily occupied by a layer of tree debris which also includes a variety of native grass and grass-like species such as Blady Grass (*Imperata cylindrica*), Kangaroo Grass (*Themeda australis*), Basket Grass (*Oplismenus aemulus*), Graceful Grass (*Ottochloa gracillima*), Barbed-wire Grass (*Cymbopogon refractus*), Wiry Panic (*Entolasia stricta*), Matrush (*Lomandra longifolia, L. filiformis, L, confertifolia*), Variable Sword Sedge (*Lepidosperma laterale*), Sword Sedge (*Gahnia aspera, G. sieberiana*), Flax Lilly (*Dianella caerulea, D. revoluta*), Gristle Fern (*Blechnum cartilagineum*), Prickly Rasp Fern (*Doodia aspera*) and Bracken (*Pteridium esculentum*).

Additional small herbaceous groundcovers, vines and twining species were also noted including Hairy Trefoil (*Desmodium rhytidophyllum*), Tape Vine (*Stephania japonica*), Barbed-wire Vine (*Smilax australis*), Rice Flower (*Pimelea linifolia*), Wombat Berry (*Eustrephus latifolius*), Snake Vine (*Hibbertia scandens*), Kangaroo Vine (*Cissus antarctica*), Native Yam (*Dioscorea transversa*), Embelia (*Embelia Australiana),* Twining Glycine (*Glycine clandestina*), Sweet Morinda (*Morinda jasminoides*), Cockspur Thorn (*Maclura cochinchinensis*), Monkey Rope (*Parsonsia straminea*), Whiteroot (*Pratia purpurascens*) and Pastel Flower (*Pseuderanthemum variabile*). Epiphytes such as Elkhorn Fern (*Platycerium bifurcatum*) and Staghorn Fern (*P. superbum*) were regularly recorded.

Environmental weed species are present, in particularly within the shrub and ground layer. The most common exotic species noted within community were Lantana (*Lantana camara*) and exotic grasses (i.e. Paspalum *spp. and Setaria spp*). Whilst not going into great detail, additional exotic weeds species noted include Crofton Weed (*Ageratina adenophora*), Mistflower (*A. riparia*), Camphor Laurel (*Cinnamomum camphora*), Balloon Cotton Bush (*Gomphocarpus physocarpus*), Privets (*Ligustrum spp.*), Passion Vines (*Passiflora spp.*), Easter Cassia (*Senna pendula var. glabrata*) and Purple Tops (*Verbena spp.*).

Evidence of human disturbances are common throughout this community with stumps commonly noted from previous logging efforts, compacted vehicles tracks, rubbish debris and fence lines observed.

Dunn's White Gum tall open forest of the ranges of the northern NSW North Coast Bioregion (PCT 812)

This plant community type generally occupies the lower laying areas of the site including gully lines and is approximately 342.8ha in area.

The canopy layer is primarily dominated by Flooded Gum (*Eucalyptus grandis*), although portions of the site are co-dominant with Brush Box (*Lophostemon confertus*). The canopy height varies between 22m - 28m although several emergent Flooded Gums exceeds this.

Additional canopy trees noted within this community type includes Tallowood (*E. microcorys*), Pink Bloodwood (*Corymbia intermedia*), Sydney Blue Gum (*E. saligna*), Hoop Pine (*Araucaria cunninghamii*) and Turpentine (*Syncarpia glomulifera*).

Similarly, to PCT 1073, the small tree and shrub layer varies considerable depending on previous disturbances. Species noted were similar to those previously quoted within PCT 1073 and included Blackwood (*Acacia melanoxylon*), Forest She-Oak (*Allocasuarina torulosa*), Willow Bottlebrush (*Callistemon salignus*) Red Ash (*Alphitonia excelsa*), Rose Myrtle (*Archirhodomyrtus beckleri*), Coffee Bush (*Breynia oblongifolia*), Jackwood (*Cryptocarya glaucescens*), Forest Maple (*C. rigida*),Blue Lilly Pilly (*Syzygium oleosum*), Narrow-leaved Orangebark (*Denhamia silvestris*), Ribbonwood (*Euroschinus falcatus var. falcatus*), Cheese Tree (*Glochidion ferdinandi*), Guioa (*Guioa semiglauca*), Foambark Tree (*Jagera pseudorhus var. pseudorhus*), Red Kamala (*Mallotus philippensis*), Hairy-leaved Bolly Gum (*Neolitsea dealbata*), Celery Wood (Celery Wood), Geebung (*Persoonia adenantha*), Scrub Turpentine (*Rhodamnia rubescens*), Scentless Rosewood (*Synoum glandulosum subsp. glandulosum*), Tree Heath (*Trochocarpa laurina* and Water Gum (*Tristaniopsis laurina*).

Similarly, the lower strata are likewise to PCT 1073 depending on weed abundance. The ground layer within areas in moderate / good condition primarily consisted of Gristle Fern (*Blechnum cartilagineum*), Prickly Rasp Fern (*Doodia aspera*), Bracken (*Pteridium esculentum*), Matrush (*Lomandra longifolia, L. filiformis, L, confertifolia*) with Variable Sword Sedge (*Lepidosperma laterale*), Sword Sedge (*Gahnia aspera, G. sieberiana*), and native grasses (i.e. *Imperata cylindrica, Ottochloa gracillima*) also present.

Smaller forb type species were also common which included Hairy Trefoil (*Desmodium rhytidophyllum*), Whiteroot (*Pratia purpurascens*), Flax Lilly (*Dianella caerulea, D. revoluta*) and Pastel Flower (*Pseuderanthemum variabile*).

Vines were regularly observed, in particularly Barbed-wire Vine (*Smilax australis*, Wombat Berry (*Eustrephus latifolius*), Snake Vine (*Hibbertia scandens*), Kangaroo Vine (*Cissus antarctica*), Water Vine (*C. hypoglauca*), Native Yam (*Dioscorea transversa*), Embelia (*Embelia Australiana),* Twining Glycine (*Glycine clandestina*), Sweet Morinda (*Morinda jasminoides*) and Cockspur Thorn (*Maclura cochinchinensis*).

Environmental weed density varied considerably throughout the subject site. Lower laying areas associated with gully lines and streams were dominated by large patches of Lantana (*Lantana camara*) while areas proximate to the Tweed River were plagued by Privets (*Ligustrum lucidum, L. sinese*) with Camphor Laurel (*Cinnamomum camphora*), Castor Oil Plant (*Ricinus communis*), Wild Tobbacco (*Solanum mauritianum*) and exotic grasses (i.e. *Setaria spp., Paspalum spp*.) also common.

White Booyong – Fig subtropical rainforest of the NSW North Coast Bioregion (PCT 1302)

This PCT occurs in the northwestern portion of the subject site is a generally small patch in comparison to the rest of the site (~5.5 ha). This rainforest community occurs in a low-laying area of the site within a gully line. This community is well removed from the proposed development footprint and is proposed to be subject to future restoration/rehabilitation works.

The canopy layer is dominated by Bangalow Palm (*Archontophoenix cunninghamiana*) with lesser occurring Turpentine (*Syncarpia glomulifera*), Pink Bloodwood (*Corymbia intermedia*), Brush Box (*Lophostemon confertus*), Steelwood (*Sarcopteryx stipata*) and Maiden's Bush (*Sloana australis*).

Typical to rainforest communities within the locality, the small tree and shrub strata is the dominant layer. Species noted included juvenile Bangalow Palms, Hairy Pubescens (*Acronychia pubescens*), Walking-stick Palm (*Linospadix monostachyos*), Guioa (*Guioa semiglauca*), Green-leaved Rose Walnut (*Endiandra muelleri subsp. bracteata*), Murrogun (*Cryptocarya microneura*), Broad-leaved Palm Lily (*Cordyline petiolaris*), Flintwood (*Scolopia braunii*), Celery Wood (*Polyscias elegans*), Rough Treefern (*Cyathea australis*), Bolly Gum (*Litsea reticulata*), Myrtle Ebony (*Diospyros pentamera*) and Green Bolly Gum (*Neolitsea australiensis*).

The ground layer primarily consisted of a deep leaf litter layer containing palm fronds and fallen timber / logs. Gristle Fern (*Blechnum cartilagineum*), Water Vine (*Cissus hypoglauca*) and Bellbird Vine (*Melodinus acutiflorus*) were also commonly recorded.

Weed species were generally scarce although Lantana (*Lantana camara*) was still evident throughout the area.

Plantation

A significant portion of the subject site (~338ha) consists of plantation consisting of juvenile and semi-mature Eucalypt and Corymbian species.

Plantation species noted were Flooded Gum (*Eucalyptus grandis*), Sydney Blue Gum (*E. saligna*), Blackbutt (*E. pilularis*) and Spotted Gum (*Corymbia citriodora*).

The shrub and ground layer were dominated by Lantana (*Lantana camara*) and/or exotic grasses (in particularly *Paspalum* species and *Setaria* species). Additional herbaceous weeds were also common such as Crofton Weed (*Ageratina adenophora*), Mistflower (*Ageratina riparia*), Groundsel (*Baccharis halimifolia*), Camphor Laurel (*Cinnamomum camphora*), Balloon Cotton Bush (*Gomphocarpus physocarpus*) and Wild Tobacco (*Solanum mauritianum*).

Although generally sparse, regrowth of native species typical to those associated with PCT 1073 and PCT 812 were noted. Native ground covers were also recorded such as Blady Grass (*Imperata cylindrica*) and Bracken (*Pteridium esculentum*).

It is acknowledged that plantation areas of the site have been treated as 'cleared/modified areas' and has not been designated a PCT. The plantation is subject to forestry permits which allows the owner to log and mill the timber. It is further noted that Tweed Council have treated areas of native plantation as a 'highly-modified community' within the *Flora and Fauna Survey and Preliminary Impact Assessment for the Proposed Raising of Clarrie Hall Dam, Tweed Shire, NSW* (TSC, 2017) and does not designate the community a Plant Community Type.

Camphor Laurel Dominant Closed to Open Forest

Camphor Laurel (*Cinnamomum camphora*) dominated forest occurs in the northeastern areas of the subject site along the banks of Kunghurloo Creek and comprises approximately 5.6ha of the subject site.

The canopy layer almost entirely consists of Camphor Laurel (*Cinnamomum camphora*) in a closed forest structure although some areas are more reflective of open forest due to a lesser stem density. The mid and low stratum of the community varies from being sparsely occupied (due to dense stands of Camphor Laurel) or extremely dense and occupied by weed thickets, although native vegetation residually occurs.

The shrub and ground layer noted included Willow Bottlebrush (*Callistemon salignus*), Mat-rushes (*Lomanra hystrix, L. longifolia*), Privets (*Ligustrum spp.*), Silky Oak (*Grevillea robusta*), Wattles (*Acacia spp.*), Lantana (*Lantana camara*), Gristle Fern (*Blechnum cartilagineum*) and other exotic grasses and herbaceous weeds previously noted.

This community is well removed from the proposed development footprint and is proposed to be subject to future restoration/rehabilitation works.

Cleared Areas / Grassed Paddocks with Scattered Trees, Regrowth and Weed Thickets

This community occupies the residual areas of the site and has been historically managed for grazing and small cropping purposes with a variety of established native pasture (*Themeda triandra, Imperata cylindrica*) and environmental weed (*Melinis minutiflora, Setaria sphacelata, S. viridis, Panicum maximum, Pennisetum purpureum, Andropogon virginicus,, Chloris gayana, Melinis repens and Paspalum spp.*) grasses dominant across the association. Height is dependent upon slashing/maintenance regimes and are approximately 0.25m in height. In excluded paddocks, along fencelines or poorly accessible areas grasses extend to >1.2m in height, particularly areas of Pigeon and Paspalum Grasses.

Weed species are prevalent in this community and are common to rural properties in the locality and are generally referred to as 'pasture' weeds due to their common association with grazing and cropping uses. Species commonly encountered are listed below as are a number of fruit/vegetable (crop) species which occur sporadically and would seem to be residual or escapees of previous small cropping pursuits on the site or nearby areas.

Residual trees noted throughout this community include Moreton Bay Fig (*Ficus macrophylla*), Turpentine (*Syncarpia glomulifera*), Camphor Laurel (*Cinnamomum camphora*), Brush Box (*Lophostemon confertus*), Forest Red Gum (*Eucalyptus tereticornis*), Flooded Gum (*Eucalyptus grandis*), Bumpy Ash (*Flindersia schottiana*), Cadaghi (*Corymbia torelliana*), Geebung (*Persoonia spp.*) and Silky Oak (*Grevillea robusta*).

Numerous low-lying areas and drainage lines occur throughout the paddocks as a result of the historical agricultural use of the site and contain semi-aquatic species such as Pennywort (*Centella asiatica*), Wandering Jew (*Commelina cyanea*), Bunchy Sedge (*Cyperus polystachyos*), Umbrella Sedge (*C. eragrostis*), Spiny-head Mat-rush (*Lomandra longifolia*), Knotweed (*Persicaria strigosa*), Pomax (*Pomax umbellata*), Bracken Fern (*Pteridium esculentum*),

As a result of the highly disturbed nature of these areas, weed species were common, in particularly typical herbaceous paddock species. Species noted (although not limited to) include Lantana (*Lantana camara*), Crofton Weed (*Ageratina adenophora*), Blue Billygoat Weed (*Ageratum houstonianum*), Formosa Lily (*Lilium formosanum*), Rattlepod (*Crotalaria spp.*), Columbian Waxweed (*Cuphea carthagenensis*), Sago Flower (*Ozothamnus diosmifolius*), Mist Flower (*Ageratina riparia*), Annual Ragweed (*Ambrosia artemisiifolia*), Groundsel Bush (*Baccaris halimifolia*), Cobbler's Pegs (*Bidens pilosa*), Flaxleaf Fleabane (*Conyza bonariensis*), Thickhead (*Crassocephalum crepidioides*), Balloon Cottonbush (*Gomphocarpus physocarpus*), Flatweed (*Hypochaeris radicata*), Inkweed (*Phytolacca octandra*), Castor Oil Plant (*Ricinus communis*), Fireweed (*Senecio madagascariensis*), Easter Cassia (*Senna pendula var. Glabrata*), Paddy's Lucerne (*Sida rhombifolia*), Wild Tobacco (*Solanum mauritianum*), Blackberry Nightshade (*Solanum nigrum*), Singapore Daisy (*Sphagneticola trilobata*), Dandelion (*Taraxacum officinale*), White Clover (*Trifolium repens*) and Purpletop (*Verbena bonariensis, V. rigida*).

Open Water

Numerous dams and waterbodies occur throughout the subject site which includes man-made farm dams to facilitate the historical agricultural uses of the land.

A variety of aquatic and semi-aquatic flora species have established proximate (and the surface) including Blue Water Lily (*Nymphaea caerulea*), Water Snowflake (*Nymphoides indica*), Fringesedge (*Fimbristylis dichotoma*), Knotweed (*Persicaria spp.*), Water Primrose (*Ludgwigia peploides*), Pennywort (*Centella asiatica*), Water Chestnut (*Eleocharis dulcis*), Spike Rush (*E. equisetina*) Salvinia (*Salvinia molesta*), Sedges (*Cyperus spp.*), Swamp Ricegrass (*Leersia hexandra*), Columbian Waxweed (*Cuphea carthagenensis*), Curled Dock (Rumex cripsus), Jointed Rush (*Baumea articulata*), Soft Twig Rush (*Baumea rubiginosa*), Mat-rushes (*Lomandra spp.*), Water Lettuce (*Pistia stratiotes*), Hyacinth (*Eichhornia crassipes*) and exotic pasture grasses and weeds previously mentioned.

3.2.2 Plant Community Type (PCT) Justification

Justification for the Plant Community Type (PCT) identification is provided below:

Pink Bloodwood – Tallowwood moist open forest of the far northern ranges of the NSW North Coast Bioregion (PCT 1073)

- The vegetation is a native vegetation community occurring within the South East Queensland Bioregion;
- The PCT is known to occur within the locality and has been recorded within ecological surveys conducted within the surrounding region;
- The canopy is co-dominated with Pink Bloodwood (*Corymbia intermedia*), Tallowwood (*Eucalyptus microcorys*), White Mahogany (*E. acmenoides*), Grey Ironbark (*E. siderophloia*) and Grey Gum (*E. propinqua*) which are the indicator species within the canopy layer for this PCT;
- The mid stratum contains species known to be associated with this PCT such as Celerywood (*Polyscias elegans*), Scrub Turpentine (*Rhodamnia rubescens*), Guioa (*Guioa semiglauca*), Tree Heath (*Trochocarpa laurina*) and Forest Oak (*Allocasuarina torulosa*); and
- The abovementioned native species and IBRA Region was entered within the BioNet Vegetation Classification program. PCT 1073 produced the highest 'number of matches' in comparison to other potential PCTs.

Dunn's White Gum tall open forest of the ranges of the northern NSW North Coast Bioregion (PCT 812)

- The vegetation is a native vegetation community occurring within the South East Queensland Bioregion;
- Whilst there was no Dunn's White Gum (*Eucalyptus dunnii*) recorded, Flooded Gum (*E. grandis*) and Brush Box (*Lophostemon confertus*) were co-dominant within the upper strata. Sydney Blue Gum (*E. saligna*) and Tallowwood (*E. microcorys*) were also observed within the canopy which are indicator species for this PCT;
- The mid and lower stratum contains species known to be associated with this PCT such as Celerywood (*Polyscias elegans*), Scrub Turpentine (*Rhodamnia rubescens*) and Water Vine (*Cissus antarctica*);
- The abovementioned native species and IBRA Region was entered within the BioNet Vegetation Classification program. PCT 812 produced the highest 'number of matches' in comparison to other potential PCTs that are not in draft.

Note: It is considered that PCT 827 (Flooded Gum – Tallowwood – Brushbox moist open forest of the coastal ranges on the North Coast) is more reflective of these mapped areas. At the point of preparing this document, this PCT was still in draft version and could not be entered into the BAM calculator. As a result, PCT 812 was utilised.

White Booyong – Fig subtropical rainforest of the NSW North Coast Bioregion (PCT 1302)

- The vegetation is a native vegetation community occurring within the South East Queensland Bioregion;
- Bangalow Palm (*Archontophoenix cunninghamiana*) is the dominant canopy species which is an indicator species for this PCT;
- Other species associated with this PCT were also recorded such as Walking-stick Palm (*Linospadix monostachya*), Broad-leaved Palm Lily (*Cordyline petiolaris*) and Maiden's Bush (*Sloanea australis*).
- The abovementioned native species and IBRA Region was entered within the BioNet Vegetation Classification program. PCT 1302 produced the highest 'number of matches' in comparison to other potential PCTs.

3.2.3 Vegetation Zones

Vegetation communities were delineated and mapped based on species composition, structure and condition assessments as described within the sections above. The condition assessment determined that eight vegetation zones (both native and exotic and includes open water) occur within the Subject Site as follows:

- PCT 1073 / Zone 1: Moderate / Good Condition Pink Bloodwood – Tallowwood moist open forest of the far northern ranges of the NSW North Coast Bioregion;

- PCT 812 / Zone 1: Moderate / Good Condition Dunn's White Gum tall open forest of the ranges of the northern NSW North Coast Bioregion;

- PCT 812 / Zone 2: Low Condition Dunn's White Gum tall open forest of the ranges of the northern NSW North Coast Bioregion;

- PCT 1302 / Zone 1: Good Condition White Booyong – Fig subtropical rainforest of the NSW North Coast Bioregion;

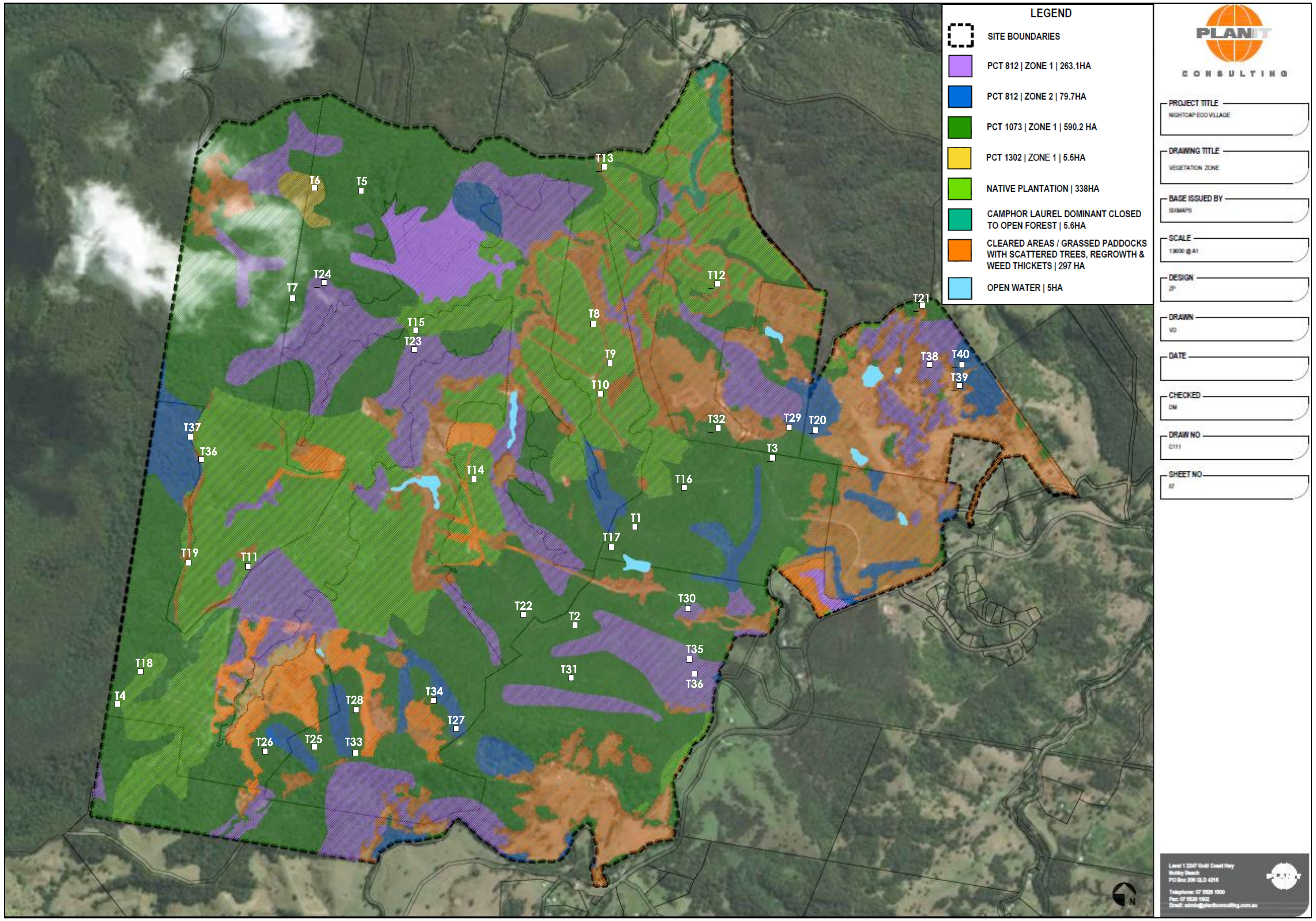
- Plantation;

- Camphor Laurel Dominant Closed to Open Forest;
- Cleared Areas / Grassed Paddocks with Scattered Trees, Regrowth & Weed Thickets; and
- Open Water.

Table 10: Vegetation Zone Sizes and Number of Plots

Vegetation Zone Name	Area within site (ha)	TEC?	Plots Completed	PCT % Cleared
PCT 1073 / Zone 1: Moderate / Good Condition Pink Bloodwood – Tallowwood moist open forest of the far northern ranges of the NSW North Coast Bioregion	590.2	No	17	40
PCT 812 / Zone 1: Moderate / Good Condition Dunn's White Gum tall open forest of the ranges of the northern NSW North Coast Bioregion	263.1	No	7	35
PCT 812 / Zone 2: Low Condition Dunn's White Gum tall open forest of the ranges of the northern NSW North Coast Bioregion	79.7	No	5	35
PCT 1302 / Zone 1: Good Condition White Booyong – Fig subtropical rainforest of the NSW North Coast Bioregion	5.5	Yes	1	75
Plantation	338	No	10	-
Camphor Laurel Dominant Closed to Open Forest	5.6	No	0	-
Cleared Areas / Grassed Paddocks with Scattered Trees, Regrowth & Weed Thickets	297	No	0	-
Open Water	5	No	0	-
Total	1584.1	-	40	-

The vegetation zone map and plot locations are illustrated within **Figure 11** below.


LEGEND
SITE BOUNDARIES
PCT 812 | ZONE 1 | 263.1HA
PCT 812 | ZONE 2 | 79.7HA
PCT 1073 | ZONE 1 | 590.2 HA
PCT 1302 | ZONE 1 | 5.5HA
NATIVE PLANTATION | 338HA
CAMPHOR LAUREL DOMINANT CLOSED TO OPEN FOREST | 5.6HA
CLEARED AREAS / GRASSED PADDOCKS WITH SCATTERED TREES, REGROWTH & WEED THICKETS | 297 HA
OPEN WATER | 5HA
PLANIT
CONSULTING
PROJECT TITLE
NIGHTCAP ECO VILLAGE
DRAWING TITLE
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Level 1 2247 Gold Coast Hwy
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Figure 11: Vegetation Zone Map and Plot Locations

3.3 Threatened Ecological Communities

Endangered Ecological Communities (EECs) are listed under Schedule 2, Part 2 of the *Biodiversity Conservation Act 2016*, while Threatened Ecological Communities (TECs) are listed under the *Environment Protection and Biodiversity Conservation Act 1999* as Critically Endangered, Endangered and Vulnerable.

An assessment of the below mentioned potentially occurring TECs (under both the BC Act and EPBC Act) has been undertaken to determine whether PCT 1302 - Fig subtropical rainforest of the NSW North Coast Bioregion and/or PCT 812 - Dunn's White Gum tall open forest of the ranges of the northern NSW North Coast Bioregion is consistent with the description for these TECs.

Biodiversity Conservation Act 2016

The following EECs listed under the BC Act was identified as potentially occurring within the development site:

- Lowland Rainforest in the NSW North Coast and Sydney Basin Bioregion (Endangered); and
- White Gum Moist Forest in the NSW North Coast Bioregion (Endangered)

White Booyong – Fig subtropical rainforest of the NSW North Coast Bioregion (PCT 1302) is potentially reflective of Lowland Rainforest in the NSW North Coast and Sydney Basin Bioregion an Endangered Ecological Community (EEC).

The occurrence of Lowland Rainforest in the NSW North Coast and Sydney Basin Bioregion is restricted to approximately 5.5ha across the subject site. This area is well removed from the proposed development footprint and will be retained.

Justification for the identification of this EEC is provided below:

- The vegetation is a native plant community occurring within the North Coast of NSW;
- Bangalow Palm (*Archontophoenix cunninghamiana*) is the dominant canopy species;
- The community contains a variety of rainforest species which characterises the EEC.

The extent of the occurrence of this EEC within the subject site is presented in **Figure 12**.

Dunn's White Gum tall open forest of the ranges of the northern NSW North Coast Bioregion (PCT 812) is potentially reflective of White Gum Moist Forest in the NSW North Coast Bioregion (EEC).

Reviewing the identification guidelines for Endangered Ecological Communities: White Gum Moist Forest in the NSW North Coast, the PCT occurring within the site is not considered to be reflective of the EEC given the absence of White Gum (*Eucalyptus dunnii*) within the canopy layer, which is a requirement for this EEC. Flooded Gum (*E. grandis*) and Brush Box (*Lophostemon confertus*) dominates the upper strata of this PCT within the site.

It is therefore considered that the EEC 'White Gum Moist Forest in the NSW North Coast Bioregion' does not occur within the subject site.

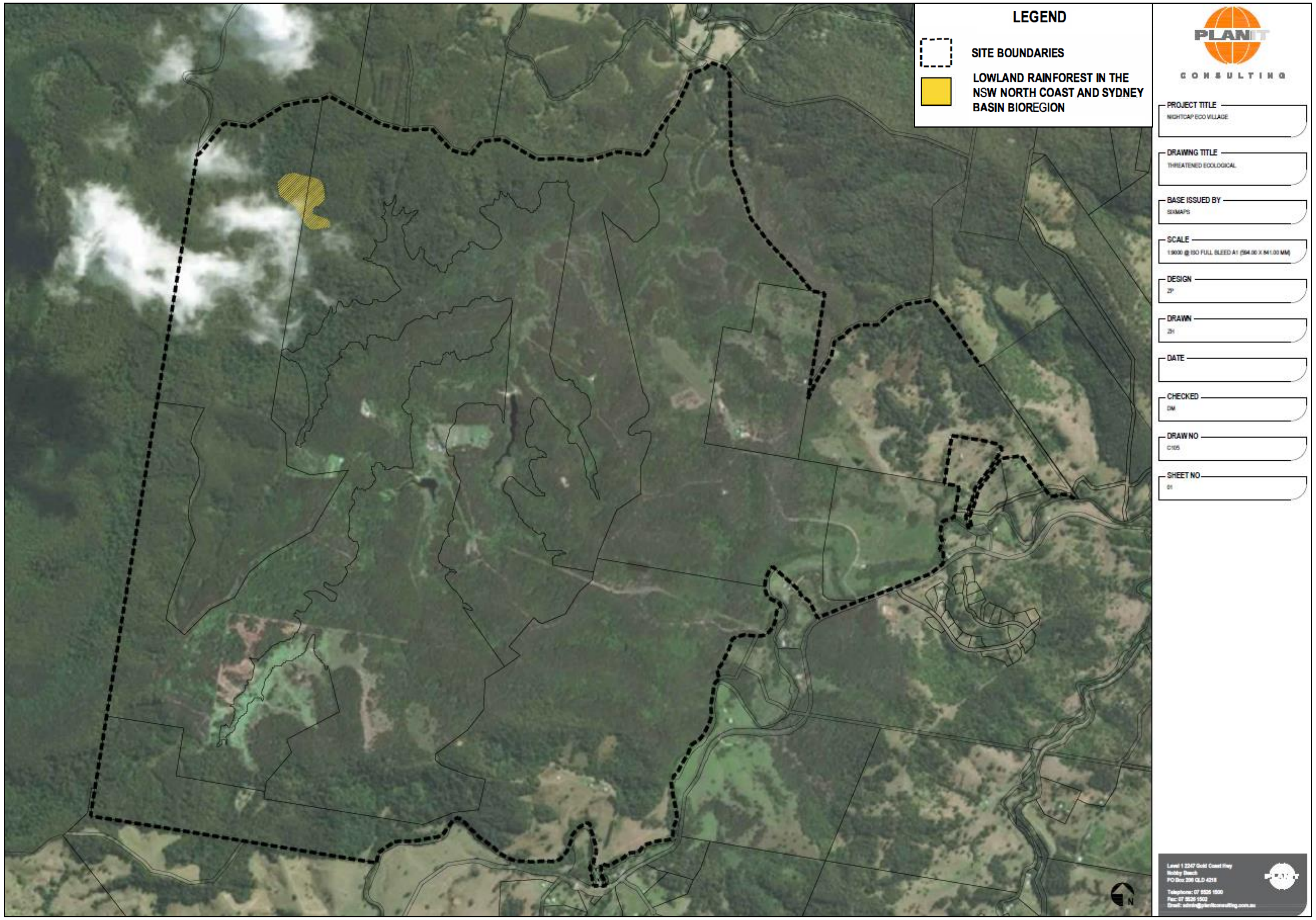
Environment Protection and Biodiversity Conservation Act 1999

The following TEC listed under the EPBC Act was identified as potentially occurring within the subject site:

- Lowland Rainforest of Subtropical Australia (Critically Endangered).

Reviewing the *Lowlands Rainforest of Subtropical Australia Listing Advice*, it is considered that PCT 1302 - Fig subtropical rainforest of the NSW North Coast Bioregion is reflective of the abovementioned TEC.

As previously discussed, this area is well removed from the development footprint and will be retained and protected.


LEGEND
SITE BOUNDARIES
LOWLAND RAINFOREST IN THE NSW NORTH COAST AND SYDNEY BASIN BIOREGION
N

PROJECT TITLE: NIGHTCAP ECO VILLAGE
DRAWING TITLE: THREATENED ECOLOGICAL
BASE ISSUED BY: SIXMAPS
SCALE: 1:9000 @ ISO FULL BLEED A1 (594.00 X 841.00 MM)
DESIGN: ZP
DRAWN: ZH
DATE:
CHECKED: DM
DRAW NO: C105
SHEET NO: 01

Level 1 2247 Gold Coast Hwy
Nobby Beach
PO Box 206 QLD 4218

Telephone: 07 5526 1500
Fax: 07 5526 1502
Email: admin@planitconsulting.com.au

Figure 12: Threatened Ecological Communities Mapping (BC Act 2016)

3.3.1 Vegetation Integrity Assessment

A vegetation integrity assessment using the BAM Credit Calculator was undertaken for native vegetation zones with the result provided in **Table 11** below.

Table 11: Vegetation Integrity Assessment Scores

Vegetation Zone	Area (ha)	Composition Condition Score	Structure Condition Score	Function Condition Score	Current Vegetation Integrity Score
PCT 1073 / Zone 1	590.2	83.1	65.7	97.2	80.9
PCT 812 / Zone 1	263.1	86	62.4	72	72.8
PCT 812 / Zone 2	79.7	65.2	41.6	74.1	58.6
PCT 1302 / Zone 1	5.5	84.1	24.5	66.9	51.6

4 Threatened Species

4.1 Identification of Threatened Species

4.1.1 Predicted Ecosystem Credit Species

The BAM calculator generates a list of threatened species which are likely to utilise the development site based on the IBRA region, patch sizes, plant community types and habitat resources

The list of predicted threatened fauna species (ecosystem species) generated by the BAM calculator is provided within **Table 12**. Habitat constraints and geographic limitations has been displayed to relevant species. For each predicted threatened species, a sensitivity class rating is also provided.

Habitat descriptions, requirements and likelihood of occurrence assessment of each predicted threatened species (ecosystem species) has been provided within **Appendix 3**.

Targeted surveys are not required for ecosystem credit species.

A total of thirty-three (33) ecosystem credit species have been predicted by the BAM calculator to occur within the site:

Table 12: Predicted Ecosystem Credits

Common Name	Species	Habitat Constraints	Geographic Limitations	Sensitivity to Gain
Pale-vented Bush-hen	*Amaurornis moluccana*	• Waterbodies • Dense vegetation, within 300m of, or in shallows of streams or	-	High

Common Name	Species	Habitat Constraints	Geographic Limitations	Sensitivity to Gain
		other natural or artificial wetlands		
Dusky Woodswallow	*Artamus cyanopterus cyanopterus*	-	-	Moderate
Glossy Black-cockatoo (foraging)	*Calyptorhynchus lathami*	• Presence of Allocasuarina and casuarina species	-	High
Hoary Wattled Bat	*Chalinolobus nigrogriseus*	-	-	High
Barred Cuckoo-shrike	*Coracina lineata*	-	-	High
Varied Sittella	*Daphoenositta chrysoptera*	-	-	Moderate
Spotted-tailed Quoll	*Dasyurus maculatus*	-	-	High
Eastern False Pipistrelle	*Falsistrellus tasmaniensis*	-	-	High
Little Lorikeet	*Glossopsitta pusilla*	-	-	High
Golden-tipped Bat	*Phoniscus papuensis*	-	-	High
Square-tailed Kite (foraging)	*Lophoictinia isura*	-	-	Moderate
Black-striped Wallaby	*Macropus dorsalis*	-	West of Kyogle	High
Little Bentwing-bat (Foraging)	*Miniopterus australis*	-	-	High
Large Bentwing-bat (foraging)	*Miniopterus orianae oceanensis*	-	-	High
Northern Free-tailed Bat	*Ozimops lumsdenae*	-	-	High
Eastern Coastal Freetail-bat	*Micronomus norfolkensis*	-	-	High
Powerful Owl (foraging)	*Ninox strenua*	-	-	High
Eastern Tube-nosed Bat	*Nyctimene robinsoni*	-	-	High
Eastern Long-eared Bat	*Nyctophilus bifax*	-	-	High
Yellow-bellied Glider	*Petaurus australis*	• Hollow bearing trees • Hollows >25cm diameter	-	High
Koala (foraging)	*Phascolarctos cinereus*	-	-	High
Marbled Frogmouth	*Podargus ocellatus*	-	-	High
Long-nosed Potoroo	*Potorous tridactylus*	• Dense shrub layer or alternatively high canopy cover	-	High

Common Name	Species	Habitat Constraints	Geographic Limitations	Sensitivity to Gain
		exceeding 70% (i.e. to capture populations inhabiting wet sclerophyll and rainforest))		
Eastern Chestnut Mouse	*Pseudomys gracilicaudatus*	-	-	High
Grey-headed Flying-fox (foraging)	*Pteropus poliocephalus*	-	-	High
Wompoo Fruit-Dove	*Ptilinopus magnificus*	-	-	Moderate
Rose-crowned Fruit-Dove	*Ptilinopus regina*	-	-	Moderate
Superb Fruit-Dove	*Ptilinopus superbus*	-	-	Moderate
Yellow-bellied Sheathtail-bat	*Saccolaimus flaviventris*	-	-	High
Greater Broad-nosed Bat	*Scoteanax rueppellii*	-	-	High
Red-legged Pademelon	*Thylogale stigmatica*	-	-	High
Masked Owl (foraging)	*Tyto novaehollandiae*	-	-	High
Sooty Owl (Foraging)	*Tyto tenebricosa*	-	-	High

4.1.2 Predicted Species Credit Species

As previously stated, species credit species are predicted by the BAM Calculator based on the PCT that occurs within the development site, the distributional range of the species, the condition of the vegetation, and patch size.

A list of the species credit species identified by the BAM calculator as potentially occurring within the development site is provided within **Table 13** below.

Table 13: Candidate Species Credit Species Identified by the BAM Calculator

Common Name	Species	Habitat Constraints	Geographic Limitations	Sensitivity to Gain
Marblewood	*Acacia bakeri*	-	Within Mt Jerusalem NP or within a 10km buffer around this NP	High
Acalypha	*Acalypha eremorum*	-	-	High
Scented Acronychia	*Acronychia littoralis*	-	Within 5km of coast	High
Giant Fern	*Angiopteris evecta*	• Waterbodies;	Within 20km of coast	Moderate

Common Name	Species	Habitat Constraints	Geographic Limitations	Sensitivity to Gain
		• Or within 50m		
White Lace Flower	*Archidendron hendersonii*	-	-	High
Hairy Jointgrass	*Arthraxon hispidus*	-	-	High
Needle-leaf Fern	*Belvisia mucronata*	• Cliffs • Escarpments and boulders | epiphytes | other • Lithophyte	-	Moderate
Yellow Satinheart	*Bosistoa transversa*	-	-	High
Border Ranges Daisy	*Brachyscome ascendens*	• Cliffs; • Basic and intermediate volcanics (not acid volcanic) or on cliff faces | rocky areas) • Rocky areas near the tops of cliffs or faces	-	High
White-crowned Snake	*Cacophis harriettae*	• Litter | Rocky Areas; • Surface rocks | Fallen/standing dead timber including logs; • Within 50m of fallen timber including logs	-	High
Glossy Black-cockatoo (breeding)	*Calyptorhynchus lathami*	• Hollow bearing trees • Living or dead tree with hollows greater than 15cm diameter and greater than 5m above	-	High
White-eared Monarch	*Carterornis leucotis*	-	-	High
Cassia Marksiana	*Cassia marksiana*	-	Within 20km of Mt Nullum	High
Eastern Pygmy-possum	*Cercartetus nanus*	-	-	High
Large-eared Pied Bat	*Chalinolobus dwyeri*	• Cliffs • Within two kilometres of rocky areas containing caves, overhangs, overhangs, escarpments, outcrops, or crevices, or within two kilometres of old mines or tunnels.	-	Very High
Giant Ironwood	*Choricarpia subargentea*	-	-	High

Common Name	Species	Habitat Constraints	Geographic Limitations	Sensitivity to Gain
Northern Clematis	*Clematis fawcettii*	-	-	High
Three-toed Snake-tooth Skink	*Coeranoscincus reticulatus*	• Leaf and bark litter | Fallen/standing timber including logs; • Timber and logs on the ground	-	High
Native Jute	*Corchorus cunninghamii*	-	-	High
Corokia	*Corokia whiteana*	-	-	High
Stinking Cryptocarya	*Cryptocarya foetida*	-	-	Moderate
Smooth Tuckeroo	*Cupaniopsis serrata*	-	-	High
Coxen's Fig-Parrot	*Cyclopsitta diophthalma coxeni*	-	-	Very High
Cliff Sedge	*Cyperus rupicola*	• Cliffs; • Or within 50m	-	High
Missionary Nutgrass	*Cyperus semifertilis*	• Metasediment geology	-	High
Davidson's Plum	*Davidsonia jerseyana*	-	East of Tyalgum	High
Smooth Davidson's Plum	*Davidsonia johnsonii*	-	East of Nimbin	Very High
Gympie Stinger	*Dendrocnide moroides*	-	-	High
Thorny Pea	*Desmodium acanthocladum*	-	-	High
Red-fruited Ebony	*Diospyros mabacea*	-	-	High
Small-leaved Tamarind	*Diploglottis campbellii*	-	-	High
Giant Spear Lily	*Doryanthes palmeri*	• Cliffs • Cliff tops, steep cliff faces or within 50m | rocky areas; • rocky outcrops or within 50m	-	High
Basket Fern	*Drynaria rigidula*	-	-	High
Nightcap Oak	*Eidothea hardeniana*	• Rhyolite soils	Nightcap NP	High
Minyon Quandong	*Elaeocarpus sedentarius*	-	Within 20km of Whian Whian SCA	High

Common Name	Species	Habitat Constraints	Geographic Limitations	Sensitivity to Gain
Hairy Quandong	*Elaeocarpus williamsianus*	-	-	High
Crystal Creek Walnut	*Endiandra floydii*	-	-	High
Rusty Rose Walnut	*Endiandra hayesii*	-	-	High
Green-leaved Rose Walnut	*Endiandra muelleri subsp. bracteata*	-	-	High
Ball Nut	*Floydia praealta*	-	Within 45km of coast	High
Sweet Myrtle	*Gossia fragrantissima*	-	-	High
Tree Guinea Flower	*Hibbertia hexandra*	-	-	High
Red Boppel Nut	*Hicksbeachia pinnatifolia*	-	-	High
Pale-headed Snake	*Hoplocephalus bitorquatus*	• Hollow bearing trees; • Within 500m of this habitat; • Within 500m of arboreal vine tangles | fallen/standing dead timber including logs	-	High
Stephans' Banded Snake	*Hoplocephalus stephensii*	• Hollow bearing trees; • Within 500m of this habitat; • Within 500m of arboreal vine tangles | fallen/standing dead timber including logs	-	High
Isoglossa	*Isoglossa eranthemoides*	-	East of Nimbin	High
Green-thighed Frog	*Litoria brevipalmata*	-	-	Moderate
Square-tailed Kite (breeding)	*Lophoictina isura*	• Nest trees	-	Moderate
Rough-shelled Bush Nut	*Macadamia tetraphylla*	-	-	High
Parma Wallaby	*Macropus parma*	-	-	High
Slender Marsdenia	*Marsdenia longiloba*	-	-	High
Little Bentwing-bat (Breeding)	*Miniopterus australis*	• Caves • Cave, tunnel, mine, culvert or other structure known or suspected to be used for breeding including species records in BioNet with	-	Very High

Common Name	Species	Habitat Constraints	Geographic Limitations	Sensitivity to Gain
		microhabitat code 'IC – in cave' - Observation type code 'E nest-roost' - With numbers of individuals >500 - Or from the scientific literature		
Large Bentwing-bat (breeding)	*Miniopterus orianae ocaeanensis*	- Caves - Cave, tunnel, mine, culvert or other structure known or suspected to be used for breeding including species records in BioNet with microhabitat code 'IC – in cave' - Observation type code 'E nest-roost' - With numbers of individuals >500	-	Very High
Giant Barred Frog	*Mixophyes iteratus*	- Land within 50m of semi-permanent and permanent drainages	-	Moderate
Southern Myotis	*Myotis macropus*	- Hollow bearing trees - Within 200m of riparian zone - Bridges, caves or artificial structures within 200m of riparian zone	-	High
Ripple-leaf Muttonwood	*Myrsine richmondensis*	-	-	High
Rusty Plum	*Niemeyera whitei*	-	-	High
Barking Owl (Breeding)	*Ninox connivens*	- Hollow bearing trees - Living or dead trees with hollows greater than 20cm diameter and greater than 4m above the ground	-	High
Powerful Owl (breeding)	*Ninox strenua*	- Hollow bearing trees - Living or dead trees with hollows greater than 20cm diameter	-	High
Atlas Rainforest Ground-beetle	*Nurus atlas*	-	-	High
Yellow-flowered King of the Fairies	*Oberonia complanata*	-	-	Moderate

Common Name	Species	Habitat Constraints	Geographic Limitations	Sensitivity to Gain
Red-flowered King of the Fairies	*Oberonia titania*	-	-	High
Southern Ochrosia	*Ochrosia moorei*	-	-	High
Onion Cedar	*Owenia cepiodora*	-	-	High
Wollumbin Dogwood	*Ozothamnus vagans*	-	-	High
Squirrel Glider	*Petaurus norfolcensis*	-	-	High
Brush-tailed Phascogale	*Phascogale tapoatafa*	• Hollow bearing trees	-	High
Koala (breeding)	*Phascolarctos cinereus*	• Areas identified via survey as important habitat	-	High
Mountain Frog	*Philoria kundagungan*	• Bogs created from human-modification to natural flows | semi-permanent / ephemeral wet areas • Boggy headwaters of rainforest streams and soaks	-	High
Loveridge's Frog	*Philoria loveridgei*	• Bogs created from human-modification to natural flows | semi-permanent / ephemeral wet areas • Boggy headwaters of rainforest streams and soaks	-	High
Common Planigale	*Planigale maculata*	-	-	High
Long-nosed Potoroo	*Potorous tridactylus*	• Dense shrub layer or alternately high canopy cover exceeding 70% (i.e. to capture populations inhabitating wet sclerophyll and rainforest)		
Grey-headed Flying-fox (breeding)	*Pteropus poliocephalus*	• Breeding camps	-	High
Spiny Gardenia	*Randia moorei*	-	-	Very High
Scrub Turpentine	*Rhodamnia rubescens*	-	-	High

Common Name	Species	Habitat Constraints	Geographic Limitations	Sensitivity to Gain
Native Guava	*Rhodomyrtus psidioides*	-	-	High
Pointed Trefoil	*Rhynchosia acuminatissima*	-	-	High
Rainforest Cassia	*Senna acclinis*	-	-	High
Brush Sophora	*Sophora fraseri*	-	-	High
Masked Owl (breeding)	*Tyto novaehollandiae*	• Hollow bearing trees • Living or dead trees with hollows greater than 20cm diameter	-	High
Red Lilly Pilly	*Syzygium hodgkinsoniae*	-	-	High
Durobby	*Syzygium moorei*	-	Within 15km of eastern boundary of Richmond – Tweed A Sub-region	High
Sooty Owl (Breeding)	*Tyto tenebricosa*	• Caves • Caves or cliffines / ledges | hollow bearing trees • Living or dead trees with hollows greater than 20cm diamter	-	Very High
Eastern Cave Bat	*Vespadelus troughtoni*	• Caves • Within two kilometres of rocky areas containing caves, overhangs escarpments, outcrops, crevices or boulder piles, or within two kilometres of old mines, tunnels, old buildings or sheds.	-	Very High

4.1.3 Identifying Candidate Species Credit Species for Further Assessment

In accordance with Section 6.4.1.17 of the BAM, a candidate species credit species will be considered unlikely to occur on the subject land (or specific vegetation zone) if:

a) after carrying out a field assessment of the habitat constraints or microhabitats on the subject land, the assessor determines that the habitat is substantially degraded such that the species is unlikely to utilise the subject land (or specific vegetation zones), or

b) an expert report that is prepared in accordance with Subsection 6.5.2 states that the species is unlikely to be present on the subject land or specific vegetation zones.

If a candidate species credit species is considered not to have suitable habitat on the subject land (or specific vegetation zones), the species does not require further assessment on the subject land (or specific vegetation zones).

The reasons for determining that a predicted species credit species is unlikely to have suitable habitat on the subject land (or specific vegetation zones) must be justified.

A habitat assessment (refer to **Section 4.2.1**) was undertaken on the 12th and 18th December 2017 which focused upon habitat features which are relevant to species credit species. This included determining presence/absence of known habitat constraints and other microhabitats which may be utilised.

The habitat requirements and likelihood of occurrence assessment for threatened biota potentially occurring within the subject site is detailed within **Appendix 3**.

The potential for each species credit species was considered following the review of the subject site, date and locations of records of threatened species, available habitat on site and the condition of the habitat. **Table 14** outlines the whether the subject it is suitable or not for each predicted candidate species and provides justification on why they have been included or excluded for further assessments.

Given the significant size of the subject site, conducting targeted flora surveys in accordance with OEH Threatened Flora Survey Guidelines (2016) across the entire subject site (>1580ha) was not practical. Areas targeted for flora surveys included the proposed development footprint buffered by approximately 30m. Habitat features, vegetation zones within the proposed development footprint was utilised in determining whether potential habitat for flora candidate species.

Surveys were conducted in the appropriate season for all targeted species in accordance with recognised survey guidelines.

Table 14: Assessment of Species Credit Species Habitat

Common Name	Species	Included / Excluded for Further Assessment	Justification for Exclusion / Inclusion
Fauna			
White-crowned Snake	*Cacophis harriettae*	Included	Potential habitat for the species occurs in the form of eucalypt forests (PCT 1073 and PCT 812) containing a well-developed leaf litter layer and fallen timber.
Glossy Black-cockatoo (breeding)	*Calyptorhynchus lathami*	Included	Suitable hollow-bearing trees present with feed trees (*Allocasuarina torulosa*) common.
White-eared Monarch	*Carterornis leucotis*	Included	Marginal habitat is present for the species in the form of eucalypt forests.
Eastern Pygmy-possum	*Cercartetus nanus*	Included	Potential habitat in association with eucalypt forests (PCT 1073 and PCT 812) containing hollow bearing trees.
Large-eared Pied Bat	*Chalinolobus dwyeri*	Included	Foraging habitat present although breeding habitat (sandstone caves/outcrops/overhangs) absent from the site.
Three-toed Snake-tooth Skink	*Coeranoscincus reticulatus*	Excluded	Preferred rainforest type habitats on loamy or sandy soils is absent from the development area.

Common Name	Species	Included / Excluded for Further Assessment	Justification for Exclusion / Inclusion
Coxen's Fig-Parrot	*Cyclopsitta diophthalma coxeni*	Excluded	It is considered that the devlopment area does not represent suitable habitat for the species given the scarcity of Figs.
Pale-headed Snake	*Hoplocephalus bitorquatus*	Included	Potential habitat for the species occurs in the form of eucalypt forests (PCT 1073 and PCT 812) containing a well-developed leaf litter layer and fallen timber.
Stephens' Banded Snake	*Hoplocephalus stephensii*	Included	Potential habitat for the species occurs in the form of eucalypt forests (PCT 1073 and PCT 812) containing a well-developed leaf litter layer and fallen timber.
Green-thighed Frog	*Litoria brevipalmata*	Included	Potential habitat for the green-thighed frog occurs in association with onsite streams and low-laying areas subject to ponding within forested areas of the site.
Square-tailed Kite (breeding)	*Lophoictina isura*	Excluded	No large raptor nests observed within the site.
Parma Wallaby	*Macropus parma*	Included	Potential habitat for the Parma Wallaby occurs in association with eucalypt forests (PCT 1073 and PCT 812) containing a dense understory.
Little Bentwing-bat (Breeding)	*Miniopterus australis*	Excluded	Only five nursery sites /maternity colonies are known in Australia which are located within limestone caves. This type of habitat is absent from the site.
Eastern Bentwing-bat (breeding)	*Miniopterus schreibersii ocaeanensis*	Excluded	Twelve known maternity roost sites occur within its distribution ranging from tens of thousands to >100000 individuals. The known large roost sites are located in limestone and sandstone caves, abandoned gold mines, concrete bunkers and lava tubes. These types of habitats are absent from the site.
Giant Barred Frog	*Mixophyes iteratus*	Included	Potential habitat is present in association with semi-permanent and permanent drainages. The species is known to occur within the locality.
Southern Myotis	*Myotis macropus*	Included	Waterbodies present with hollow-bearing trees common.
Barking Owl (Breeding)	*Ninox connivens*	Included	The site may fall within the hunting range for the barking owl given the species' large range. Suitable large hollow bearing trees present.
Powerful Owl (breeding)	*Ninox strenua*	Included	The site may fall within the hunting range for the powerful owl given the

Common Name	Species	Included / Excluded for Further Assessment	Justification for Exclusion / Inclusion
			species' large range. Suitable large hollow bearing trees present.
Atlas Rainforest Ground-beetle	*Nurus atlas*	Excluded	The species is only known to occur within the Lismore-Alstonville area containing a well-developed rainforest understory (absent from the development area).
Squirrel Glider	*Petaurus norfolcensis*	Included	Potential habitat in association with eucalypt forests (PCT 1073 and PCT 812) containing hollow bearing trees.
Brush-tailed Phascogale	*Phascogale tapoatafa*	Included	Potential habitat in association with eucalypt forests (PCT 1073 and PCT 812) containing hollow bearing trees.
Koala (breeding)	*Phascolarctos cinereus*	Included	Eucalypt forests containing feed trees abundant throughout site.
Mountain Frog	*Philoria kundagungan*	Excluded	Preferred habitat (streams >550m altitude) does not occur on site.
Loveridge's Frog	*Philoria loveridgei*	Excluded	Preferred habitat (streams >550m altitude) does not occur on site.
Common Planigale	*Planigale maculata*	Included	All forested areas of the site containing dense ground-cover vegetation provides potential habitat for the planigale.
Long-nosed Potoroo	*Potorous tridactylus*	Included	Potential habitat occurs within the development area in association with wet sclerophyll forests (PCT 1073 & PCT 812).
Grey-headed Flying-fox (breeding)	*Pteropus poliocephalus*	Excluded	No roosts camps recorded within the site. Nearest known roosting site ~10km to the east within Uki.
Masked Owl (breeding)	*Tyto novaehollandiae*	Included	Wide ranging species with suitable habitat and hollows present within the site.
Sooty Owl (Breeding)	*Tyto tenebricosa*	Included	Wide ranging species with suitable habitat and hollows present within the site.
Eastern Cave Bat	*Vespadelus troughtoni*	Included	The species may utilise the site for foraging purposes although roosting habitat absent from the site.
Flora			
Marblewood	*Acacia bakeri*	Included	Potential habitat occurs within the development area in association with wet sclerophyll forests (PCT 1073 & PCT 812).
Acalypha	*Acalypha eremorum*	Excluded	Preferred rainforest type habitat for this species is considered to be absent from the development area. No records within 10km of the site (Bionet 2019)

Common Name	Species	Included / Excluded for Further Assessment	Justification for Exclusion / Inclusion
Scented Acronychia	*Acronychia littoralis*	Excluded	This species occurs on sandy soils within close proximity to the coastline. The site does not occur within 5km of the coast (geographic constraint). No records within 10km of the site (Bionet 2019)
Giant Fern	*Angiopteris evecta*	Excluded	Preferred habitat (rainforest) is absent from the development area. The site does not occur within 20km of the coast (geographic constraint). No records within 10km of the site (Bionet 2019)
White Lace Flower	*Archidendron hendersonii*	Excluded	Preferred riverine/littoral/lowland rainforest absent from the development area. No records within 10km of the site (Bionet 2019)
Hairy Jointgrass	*Arthraxon hispidus*	Included	Potential habitat for the species occurs in shaded lower laying areas of the site proximate to streams, gullies and the edge of forests. No records within 10km of the site (Bionet 2019)
Needle-leaf Fern	*Belvisia mucronata*	Included	Potential habitat occurs in association with streams and wet areas of the site. No records within 10km of the site (Bionet 2019)
Yellow Satinheart	*Bosistoa transversa*	Included	Potential habitat occurs in the form of wet sclerophyll forests (PCT 1073 and PCT 812). No records within 10km of the site (Bionet 2019)
Border Ranges Daisy	*Brachyscome ascendens*	Excluded	Suitable habitat for this species (escarpment cliffs) is absent from the development area. The species is known from only one location in NSW (Border Ranges National Park). No records within 10km of the site (Bionet 2019)
Cassia Marksiana	*Cassia marksiana*	Excluded	Preferred rainforest type habitat is absent from the development area. No records within 10km of the site (Bionet 2019).
Giant Ironwood	*Choricarpia subargentea*	Excluded	This species is only known in NSW from Mount Chincogan near Mullumbimby and one record at Jiggi, northwest of Lismore. Rainforest type habitat absent from the development area. No records within 10km of the site (Bionet 2019).
Northern Clematis	*Clematis fawcettii*	Excluded	Preferred rainforest and vine thicket habitat absent from the development

Common Name	Species	Included / Excluded for Further Assessment	Justification for Exclusion / Inclusion
			area. No records within 10km of the site (Bionet 2019).
Native Jute	*Corchorus cunninghamii*	Included	Potential habitat occurs within the development area in association with wet sclerophyll forests. No records within 10km of the site (Bionet 2019).
Corokia	*Corokia whiteana*	Included	Brushbox dominant wet sclerophyll forest present. No records within 10km of the site (Bionet 2019). The species has been recorded on numerous occasions along Clarrie Hall Dam gully lines (TSC, 2017).
Stinking Cryptocarya	*Cryptocarya foetida*	Excluded	This species is usually found in littoral rainforest along the coast on sandy soils. No records within 10km of the site (Bionet 2019).
Smooth Tuckeroo	*Cupaniopsis serrata*	Excluded	Preferred rocky hillsides and rainforest absent from the development area. No records within 10km of the site (Bionet 2019).
Cliff Sedge	*Cyperus rupicola*	Excluded	Preferred habitat (cliff faces) absent from the development area. No records within 10km of the site (Bionet 2019).
Missionary Nutgrass	*Cyperus semifertilis*	Excluded	In NSW it is currently known from only one location in the Mullumbimby area where it was growing in open forest of *Eucalyptus acmenoides* with an open understorey. No records within 10km of the site (Bionet 2019).
Davidson's Plum	*Davidsonia jerseyana*	Included	Potential habitat occurs within the development area in association with PCT 1073 and PCT 812.
Smooth Davidson's Plum	*Davidsonia johnsonii*	Included	Potential habitat occurs within the development area in association with PCT 1073 and PCT 812.
Gympie Stinger	*Dendrocnide moroides*	Excluded	Preferred habitat (disturbed rainforest) is absent from the development area. No records within 10km of the site (Bionet 2019).
Thorny Pea	*Desmodium acanthocladum*	Included	Preferred habitat (rainforest) is considered to be absent from the development area although the species is known to occur along streams and rivers.
Red-fruited Ebony	*Diospyros mabacea*	Excluded	Preferred habitat (rainforest) is absent from the development area. No records within 10km of the site (Bionet 2019).
Small-leaved Tamarind	*Diploglottis campbellii*	Included	Marginal habitat occurs within the development area in association with

Common Name	Species	Included / Excluded for Further Assessment	Justification for Exclusion / Inclusion
			Brush Box wet sclerophyll forests (PCT 812) although community lacks a rainforest understory.
Giant Spear Lily	*Doryanthes palmeri*	Excluded	Suitable habitat (exposed rocky outcrops on cliffs) absent from the development area. No records within 10km of the site (Bionet 2019).
Basket Fern	*Drynaria rigidula*	Excluded	Preferred habitat for this species (rainforest) is absent from the development area. Only known from three locations in NSW. No records within 10km of the site (Bionet 2019).
Nightcap Oak	*Eidothea hardeniana*	Excluded	Species is only known from Nightcap National Park. No records within 10km of the site (Bionet 2019).
Minyon Quandong	*Elaeocarpus sedentarius*	Excluded	Preferred habitat for this species (rainforest slopes and gullies) is absent from the development area. No records within 10km of the site (Bionet 2019).
Hairy Quandong	*Elaeocarpus williamsianus*	Included	Potential habitat for the hairy qundong occurs in association with PCT 812. No records within 10km of the site (Bionet 2019).
Crystal Creek Walnut	*Endiandra floydii*	Included	Potential habitat is present in association with wet sclerophyll forests. No records within 10km of the site (Bionet 2019).
Rusty Rose Walnut	*Endiandra hayesii*	Included	Potential habitat occurs within the development area (PCT 1073 and PCT 812). Species is known to occur within the locality with 21 records within 10km of the site (Bionet, 2019).
Green-leaved Rose Walnut	*Endiandra muelleri subsp. bracteata*	Included	Potential habitat is present in the form of wet sclerophyll forests. Species is known to occur within the locality with 11 records within 10km of the site (Bionet, 2019).
Ball Nut	*Floydia praealta*	Excluded	Preferred riverine and subtropical rainforest absent from the development area. No records within 10km of the site (Bionet 2019).
Sweet Myrtle	*Gossia fragrantissima*	Excluded	Preferred habitat (riverine rainforest) for this species is considered to be absent from the development area.
Tree Guinea Flower	*Hibbertia hexandra*	Excluded	Known habitat types (heath and rainforest) absent from the development area. No records within 10km of the site (Bionet 2019).
Red Boppel Nut	*Hicksbeachia pinnatifolia*	Included	Potential habitat occurs within the development area in association with

Common Name	Species	Included / Excluded for Further Assessment	Justification for Exclusion / Inclusion
			PCT 1073 and PCT 812. No records within 10km of the site (Bionet 2019).
Isoglossa	*Isoglossa eranthemoides*	Excluded	Preferred habitat (rainforest) is absent from the development footprint.
Rough-shelled Bush Nut	*Macadamia tetraphylla*	Included	Although preferred rainforest type habitat is absent from the development area, this species is widely cultivated and commonly recorded as planted specimens within rural lands (pers. obs.).
Slender Marsdenia	*Marsdenia longiloba*	Included	Potential habitat occurs in the form of eucalypt forests (PCT 1073 and PCT 812). No records within 10km of the site (Bionet 2019).
Ripple-leaf Muttonwood	*Myrsine richmondensis*	Excluded	Preferred rainforest type habitat is absent from the development area. There are only three known populations of this species with the nearest being ~35km to the south within Boatharbour Nature Reserve. No records within 10km of the site (Bionet 2019).
Rusty Plum	*Niemeyera whitei*	Included	Marginal habitat is present in the form of moist eucalypt forests (PCT 1073 and PCT 812). No records within 10km of the site (Bionet 2019).
Yellow-flowered King of the Fairies	*Oberonia complanata*	Included	Preferred habitat (rainforest) is absent from the development area, although marginal potential habitat occurs in the form of wet sclerophyll forests (PCT 1073 and PCT 812). No records within 10km of the site (Bionet 2019).
Red-flowered King of the Fairies	*Oberonia titania*	Included	Preferred habitat (rainforest) is absent from the development area, although marginal potential habitat occurs in the form of wet sclerophyll forests (PCT 1073 and PCT 812). No records within 10km of the site (Bionet 2019).
Southern Ochrosia	*Ochrosia moorei*	Excluded	Preferred riverine and lowland rainforest and complex notophyll vine forest absent from the development area. No records within 10km of the site (Bionet 2019).
Onion Cedar	*Owenia cepiodora*	Included	Although preferred rainforest type habitat is absent from the development area, the species was recorded along the edge of Bog Onion Road within Mebbin National Park. There are four Bionet records

Common Name	Species	Included / Excluded for Further Assessment	Justification for Exclusion / Inclusion
			occurring within 10km of the subject site.
Wollumbin Dogwood	*Ozothamnus vagans*	Excluded	Preferred habitat (altitude >500m) absent from the development area. No records within 10km of the site (Bionet 2019).
Spiny Gardenia	*Randia moorei*	Included	Potential habitat occurs within the development footprint in association with PCT 812. No records within 10km of the site (Bionet 2019).
Scrub Turpentine	*Rhodamnia rubescens*	Included	Potential habitat is present in the form of wet sclerophyll forests (PCT 1073 and 812). There are five records of this species occurring within 10km of the subject site (Bionet, 2019).
Native Guava	*Rhodomyrtus psidioides*	Included	Potential habitat is present in the form of wet sclerophyll forests (PCT 1073 and 812). There is one record of this species occurring within 10km of the subject site (Bionet, 2019).
Pointed Trefoil	*Rhynchosia acuminatissima*	Excluded	Potential habitat occurs within the development area in association with PCT 812. No records within 10km of the site (Bionet 2019).
Rainforest Cassia	*Senna acclinis*	Included	Species regularly recorded along road edges and ecotones rainforest is nearby.
Brush Sophora	*Sophora fraseri*	Included	Potential habitat occurs along margins of wet sclerophyll forests of the site (PCT 1073 and PCT 812). No records within 10km of the site (Bionet 2019).
Red Lilly Pilly	*Syzygium hodgkinsoniae*	Included	Marginal habitat occurs onsite along watercourses and gully lines. There are no Bionet records of this species within 10km of the site. The species has been recorded on numerous occasions along Clarrie Hall Dam gully lines (TSC, 2017).
Durobby	*Syzygium moorei*	Included	Although preferred rainforest type habitat is absent from the development area, marginal potential habitat occurs onsite along watercourses and gully lines. Within rural areas, species regularly found as individual trees within grassed paddocks or planted within garden beds.

4.1.4 Candidate Species for Further Assessment

The following species were identified as candidate species credit species which required further assessment. The species survey period specified for each species is also provided within **Table 15** below. It is noted that targeted surveys were conducted within suitable survey periods for each candidate species.

Table 15: Species Credit Species Nominated Survey Periods

Species	Survey Timing											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Fauna												
White-crowned Snake	Y	**Y**	**Y**	Y	N	N	N	N	Y	Y	Y	Y
Glossy Black-cockatoo (breeding)	N	N	N	**Y**	**Y**	Y	Y	Y	N	N	N	N
White-eared Monarch	**Y**	**Y**	**Y**	**Y**	**Y**	Y	Y	Y	**Y**	**Y**	**Y**	**Y**
Eastern Pygmy-possum	**Y**	**Y**	**Y**	N	N	N	N	N	N	**Y**	**Y**	**Y**
Large-eared Pied Bat	**Y**	**Y**	Y	Y	Y	Y	Y	Y	Y	Y	Y	**Y**
Pale-headed Snake	Y	**Y**	**Y**	N	N	N	N	N	N	N	Y	Y
Stephens' Banded Snake	Y	**Y**	**Y**	N	N	N	N	N	N	Y	Y	Y
Green-thighed Frog	**Y**	**Y**	**Y**	N	N	N	N	N	N	**Y**	**Y**	**Y**
Parma Wallaby	**Y**	**Y**	**Y**	**Y**	**Y**	Y	Y	Y	**Y**	**Y**	**Y**	**Y**
Fleay's Barred Frog	**Y**	**Y**	**Y**	N	N	N	N	N	Y	**Y**	**Y**	**Y**
Giant Barred Frog	**Y**	**Y**	**Y**	N	N	N	N	N	N	**Y**	**Y**	**Y**
Southern Myotis	**Y**	**Y**	Y	N	N	N	N	N	N	Y	Y	**Y**
Barking Owl (Breeding)	N	N	N	N	**Y**	Y	Y	**Y**	**Y**	**Y**	**Y**	**Y**
Powerful Owl (breeding)	N	N	N	N	**Y**	Y	Y	**Y**	N	N	N	N
Squirrel Glider	**Y**	**Y**	**Y**	**Y**	**Y**	Y	Y	**Y**	**Y**	**Y**	**Y**	**Y**
Brush-tailed Phascogale	**Y**	**Y**	**Y**	**Y**	**Y**	Y	Y	**Y**	**Y**	**Y**	**Y**	**Y**
Koala (breeding)	**Y**	**Y**	**Y**	**Y**	**Y**	Y	Y	**Y**	**Y**	**Y**	**Y**	**Y**
Common Planigale	Y	**Y**	**Y**	Y	Y	Y	Y	Y	Y	Y	Y	Y
Long-nosed Potoroo	**Y**	**Y**	**Y**	Y	Y	Y	Y	Y	Y	Y	Y	**Y**
Grey-headed Flying-fox (breeding)	N	N	N	N	N	N	N	N	N	**Y**	**Y**	**Y**

Species	Survey Timing											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Masked Owl (breeding)	N	N	N	N	**Y**	Y	Y	**Y**	N	N	N	N
Sooty Owl (Breeding)	N	N	N	**Y**	**Y**	Y	Y	**Y**	N	N	N	N
Eastern Cave Bat	**Y**	N	N	N	N	N	N	N	N	N	Y	**Y**
Flora												
Marblewood	**Y**	**Y**	**Y**	**Y**	Y	Y	Y	Y	Y	Y	Y	**Y**
Hairy Jointgrass	**Y**	**Y**	**Y**	**Y**	N	N	N	N	N	N	Y	**Y**
Needle-leaf Fern	**Y**	**Y**	**Y**	**Y**	Y	Y	Y	Y	Y	Y	Y	**Y**
Yellow Satinheart	**Y**	**Y**	**Y**	**Y**	Y	Y	Y	Y	Y	Y	Y	**Y**
Native Jute	**Y**	**Y**	**Y**	**Y**	Y	Y	Y	Y	Y	Y	Y	**Y**
Corokia	**Y**	**Y**	**Y**	**Y**	Y	Y	Y	Y	Y	Y	Y	**Y**
Davidson's Plum	**Y**	**Y**	**Y**	**Y**	Y	Y	Y	Y	Y	Y	Y	**Y**
Smooth Davidson's Plum	**Y**	**Y**	**Y**	**Y**	Y	Y	Y	Y	Y	Y	Y	**Y**
Thorny Pea	**Y**	**Y**	**Y**	**Y**	Y	Y	Y	Y	Y	Y	Y	**Y**
Small-leaved Tamarind	**Y**	**Y**	**Y**	**Y**	Y	Y	Y	Y	Y	Y	Y	**Y**
Hairy Quandong	**Y**	**Y**	**Y**	**Y**	Y	Y	Y	Y	Y	Y	Y	**Y**
Crystal Creek Walnut	**Y**	**Y**	**Y**	**Y**	Y	Y	Y	Y	Y	Y	Y	**Y**
Rusty Rose Walnut	**Y**	**Y**	**Y**	**Y**	Y	Y	Y	Y	Y	Y	Y	**Y**
Green-leaved Rose Walnut	**Y**	**Y**	**Y**	**Y**	Y	Y	Y	Y	Y	Y	Y	**Y**
Red Boppel Nut	**Y**	**Y**	**Y**	**Y**	Y	Y	Y	Y	Y	Y	Y	**Y**
Rough-shelled Bush Nut	**Y**	**Y**	**Y**	**Y**	Y	Y	Y	Y	Y	Y	Y	**Y**
Slender Marsdenia	**Y**	**Y**	N	N	N	N	N	N	N	N	Y	**Y**
Rusty Plum	**Y**	**Y**	**Y**	**Y**	Y	Y	Y	Y	Y	Y	Y	**Y**
Yellow-flowered King of the Fairies	**Y**	**Y**	**Y**	**Y**	Y	Y	Y	Y	Y	Y	Y	**Y**
Red-flowered King of the Fairies	**Y**	**Y**	**Y**	**Y**	Y	Y	Y	Y	Y	Y	Y	**Y**
Onion Cedar	**Y**	**Y**	**Y**	**Y**	Y	Y	Y	Y	Y	Y	Y	**Y**
Spiny Gardenia	**Y**	**Y**	**Y**	**Y**	Y	Y	Y	Y	Y	Y	Y	**Y**
Rainforest Cassia	**Y**	**Y**	**Y**	**Y**	Y	Y	Y	Y	Y	Y	Y	**Y**
Brush Sophora	**Y**	**Y**	**Y**	**Y**	Y	Y	Y	Y	Y	Y	Y	**Y**
Scrub Turpentine	**Y**	**Y**	**Y**	**Y**	Y	Y	Y	Y	Y	Y	Y	**Y**
Native Guava	**Y**	**Y**	**Y**	**Y**	Y	Y	Y	Y	Y	Y	Y	**Y**
Red Lilly Pilly	**Y**	**Y**	**Y**	**Y**	Y	Y	Y	Y	Y	Y	Y	**Y**
Durobby	**Y**	**Y**	**Y**	**Y**	Y	Y	Y	Y	Y	Y	Y	**Y**

Note: Highlighted month is the month in which targeted surveys were undertaken for the relevant species during their nominated survey periods.

4.2 Threatened Species Survey

4.2.1 Habitat Assessment

Prior to the commencement of the targeted survey works on site a broad habitat assessment was conducted over the site. The purpose of this overview was to determine potential occurrence of fauna (discussed within **Section 4.1**) based on available habitat components and to target areas for detailed surveying of threatened fauna species. The following habitat components were reviewed and occur as a result of previous land use, vegetation types, geomorphic variability, surrounding uses and hydraulic regime:

Table 16: Site Habitat Features

Habitat Element/Feature	Comment
Presence of hollow bearing trees	Abundant.
Presence of koala habitat and/or favoured koala trees	Eucalypt forests containing local koala feed trees abundant.
Presence of caves, culverts or disused buildings suitable for roosting of microchiropteran bat species	No culverts or caves present. Numerous man-made structures and shelters throughout site. Microbat nest boxes erected throughout the plantation areas of the site. No microbats recorded roosting within these areas.
Presence of scratches or feeding scars on tree trunks	Scratches (koalas, gliders, possums, goannas) commonly observed on smooth barked trees. Feeding scars typical to petaurids were noted on Bloodwoods.
Presence of megabat roosting sites	Not recorded.
Presence of creeklines, estuaries, mudflats, mangroves and/or riparian vegetation	Present. Tweed River, Kunghuroo Creek and numerous ephemeral streams throughout site.
Presence of dams, ponds, lakes and/or other natural or constructed permanent water sources	Several waterbodies and constructed dams present.
Presence of dense understorey and ground cover vegetation	Abundant throughout site.
Presence of deep leaf litter layer and/or debris (fallen logs etc.)	Abundant throughout the forested areas of the site.
Presence of fruiting flora species	Fruiting species common throughout site.
Presence of flowering species	Common including typically prolifically flowering genus such as eucalypt, corymbian, wattle, callistemons etc.
Presence of large stick nests indicative of raptor presence	Not recorded.
Presence of rocky outcrops and/or extensive exposed rocky areas favoring reptile populations	Exposed rocks associated with streams/gully lines present. Gravel roads also present.

4.3 Targeted Threatened Flora Techniques and Survey Results

Targeted flora searches were completed by walking parallel transects spaced approximately 10-20 m apart (depending on vegetation density and topography) across parts of the development footprint that support potential habitat, with reference to *NSW Guide to Surveying Threatened Plants (OEH, 2016)*.

Given the significant size of the subject site, conducting the abovementioned targeted survey techniques across the entire subject site (>1580ha) was not practical. Areas targeted for flora surveys included the proposed development footprint buffered by approximately 30m.

Opportunistic flora surveys were also conducted while conducting vegetation integrity plot surveys, habitat assessments, and other survey methods conducted within **Section 4.4** below.

It is noted that several areas of the development footprint were impassible on foot. These areas were primarily areas of plantation consisting of a very dense Lantana understory (up to 2m in height). These areas are highly modified and represents poor habitat for threatened species.

Targeted threatened flora surveys were undertaken in Summer and early Autumn (December 2018 - April 2019) which is a suitable time of year to be surveying the candidate threatened flora species identified as potentially occurring within the development site (refer to **Table 15**).

For the most part, visibility across the survey area was good, with moderate midstorey vegetation present, which allowed for easy sighting of all species in the understorey and midstorey. The site was also easily traversed on foot, with minimal barriers to movement encountered during the field survey (with the exception of Lantana dominant areas as previously mentioned and some areas of severe slope).

Threatened flora species recorded during flora surveys have been presented within **Figure 16**.

4.4 Fauna Survey Techniques

Diurnal Survey Methodology

- Binocular search and identification of all fauna heard or sighted;
- Bird identification surveys were conducted in association with dawn and dusk activity and comprised walked transects through the study area;

Duration: 6 x dawn/mid-morning (60 minutes) and 27 x dusk (2 x 45 minutes) [17th January 2018 – 1st May 2019]

- Ground track/trace survey was performed including:
  - Scat/pellet examination
  - Scratch/trace examination of trees
  - Diggings, burrow, trace and track examination
  - Humus/crevice examination
  - Examination and assessment of tree hollows, hanging bark, termite mounds, flowering and nesting trees etc.

Duration: Opportunistic during other survey works

ALL RECORDED HOLLOW LOGS SEARCHED FOR FAUNA ACTIVITY

HOLLOW LOG SEARCHED WITH A TORCH

- Diurnal bird and frog call recognition and identification opportunistically performed during other survey works

Duration: Opportunistic during other survey works

- Ground strata searches and rock/timber/leaf litter rolls and examination for reptiles and frogs. All log and timber rolls were returned in their original state following inspection.

Duration: 10 x 30 minutes during the middle of the day [19th February 2019 – 26th March 2019], opportunistic during all other survey works.

LOG ROLL INSPECTED FOR POTENTIAL REPTILE AND FROG USE

THE SAME LOG RETURNED TO ORIGINAL STATE FOLLOWING INSPECTION

- Opportunistic microbat roost searches were undertaken by looking for bats or signs of bats (urine stains, droppings, remains) in suitable habitat. Depending on the species this may be trees, caves or overhangs, old buildings and sheds or bridges, mines and culverts (Churchill 2008). All roost searches utilised a torch to shine into any potential roosting areas (i.e. suitable holes/cracks/crevices in trees, man-made structures such as bridges and shelters). An *Echo Meter Touch 2 Pro* was attached to the surveyor's *Iphone* for microbat identification.

CREVICE WITHIN TREE SEARCHED FOR POTENTIAL MICROBAT ROOSTING SITE

- Nine motion triggered trail cameras (ScoutGuard SG550PV-31B) were placed within the study area between 12th December 2017 – 20th March 2018 and 18th February 2019 – 7th March 2019 to digitally capture fauna activity. Such passive camera traps were deployed in accordance with DSEWPC (2011) 'Survey guidelines for Australia's threatened mammals: Guidelines for detecting mammals listed as threatened under the *Environment Protection and Biodiversity Conservation Act* 1999. "Passive systems are single units that use heat and motion detectors to trigger the camera (Kelly & Holub 2008). Infrared sensors work better at cooler ambient temperatures and are less consistent in warm environments (Swann et al. 2004). Camera trapping has been found to be the most effective method of detecting species at low or moderate densities (Vine et al. 2009 in DSEWPC, 2011: 32)."

Cameras were fixed to trees approximately 75-100cm from ground level and aimed at a bait station. Cameras were programmed to operate 24 hours and take 3-image bursts triggered by motion. A 60 second delay was programmed between bursts. Each bait station consisted of either a fresh chicken frame (carnivore), a mixture of tuna oil, sardines and flour (carnivore) or a mixture of oats, peanut butter and golden syrup (generalist). To reduce the ability for a single animal to move the bait away from the camera station the chicken pieces were tied a log or to the ground and secured with tent pegs. The generalist or tuna-based bait was placed within a 50mm PVC vent cowl or a metal container which was also secured via a tent peg (per Paull et al, 2011).

In addition, tuna oil or aniseed oil was sprayed in an approximate 2m radius around each bait station to act as an attractant.

The cameras were rotated to a new location of the study area every 7-14 days during the survey period with fresh bait installed.

DEPLOYED CAMERA POINTING AT BAIT STATION

DEPLOYED CAMERA

Duration: Nine cameras for 114 nights in total.

- Thirty-seven hair funnels (Faunatech) were deployed in general accordance with DSEWPC (2011) '*Survey guidelines for Australia's threatened mammals: Guidelines for detecting mammals listed as threatened under the Environment Protection and Biodiversity Conservation Act 1999*.' This included installing hair funnels (Faunatech large opening reducing to small) at least 50m apart. The bait utilised included a mixture of sardines and tuna oil with flour utilised as a binding agent or a generic mixture of oats, peanut butter and golden syrup. In addition, tuna oil or aniseed was sprayed in an approximate 2m radius around each funnel to act as an attractant. Each hair funnel was marked in the field with a piece of flagging tape on a proximate tree (except where visible from nearby residences/roadways i.e. to avoid potential theft/vandalism) and the location recorded via hand-held GPS (to enable retrieval and mapping). Following deployment, hair funnel wafers with positive results were sent to a private laboratory (Scats About P/L) for analysis.

DEPLOYED HAIR FUNNEL WITHIN PCT 1073

DEPLOYED HAIR FUNNEL WITHIN PCT 1302

Table 17: Review of Trapping Effort

	Camera Traps	Hair Funnels	Anabat
Number of nights	115	28	43
Number of traps	9	37	1
Total number of trap nights	1035	1036	43

NOCTURNAL SURVEY METHODOLOGY

Nocturnal survey included the following survey techniques:

- Audible survey for calls, scratching and landings;
- Spotlighting focusing on flowering and senescent trees, hollow-bearing trees, open grassland and canopy breaks utilising:
  - Short duration-long distance white light, and
  - Long duration-short distance red light

Duration: Two researchers on twenty-seven nights for 120 minutes each night (108 person hours) [17th January 2018 – 1st May 2019]

- Naked eye observation utilising dusk/moon light for bats and fauna returning to potential nest/shelter areas (i.e. stagwatching). Due to the abundance of hollow-bearing trees within the subject site, select trees were observed at dusk to detect arboreal fauna emerging from associated hollows. Hollow-bearing trees selected for stag-watching were those that showed evidence of usage (or likely usage) by arboreal fauna.

Duration: Twenty-seven dusk/evenings [17th January 2018 – 1st May 2019]

- Amphibian waterbody assessments were conducted at night along areas considered to represent potential habitat for amphibians (i.e. watercourses). This included randomized walks (minimum of 200m) adjacent the watercourse/stream actively looking for exposed frogs and active frogs and eyeshine. Aspects of the watercourse and adjacent areas were searched, including under rocks and logs, under bark, leaf litter and emergent vegetation. Call playback was conducted randomly for targeted species either from the surveyor's mobile phone, or on a 25W Toa Megaphone.

Duration: Two researchers on fifteen sites for 45 minutes

- Anabat detection system was utilised to record echolocation of microchiropteran bats along spotlighting transects and from fixed points. Recordings were undertaken in areas most likely to attract bat species including waterbodies, 4wd tracks, remnant edges, areas of flowering vegetation and sites of high insect activity. Calls were then sent to 'Fly By Night' for analysis and confirmation.

Duration: forty-three nights' stationary recording (1830-0400).

DEPLOYED ANABAT FACING A DAM	DEPLOYED ANABAT

- Nine motion triggered trail cameras (ScoutGuard SG550PV-31B) were deployed as discussed in 'diurnal' above

- Amplified call recording/playback for avifauna and mammals. These were conducted either at dawn, dusk or at the conclusion of spotlighting efforts, depending on the targeted species. Playback of pre-recorded calls included the following threatened species:
  - Koala
  - Squirrel Glider
  - Yellow-bellied Glider
  - White-eared Monarch
  - Green-thighed Frog
  - Square-tailed Kite
  - Fleay's Barred Frog
  - Giant Barred Frog
  - Pouched Frog
  - Barking Owl
  - Powerful Owl
  - Masked Owl
  - Sooty Owl
  - Pale-vented Bush-hen
  - Wompoo Fruit-dove
  - Rose-crowned Fruit-dove
  - Superb Fruit-dove
  - Barred Cuckoo-shrike
  - Scarlet Robin
  - Eastern Bristlebird
  - Glossy Black-cockatoo
  - Marbled Frogmouth
  - Little Lorikeet

Each call playback session comprised of the following:
  - A 5min listening period for unelicited fauna calls
  - A 5min call playback for relevant species on a 25W Toa Megaphone
  - A 10min search/spotlight for fauna at the playback site

Depending on the targeted species playback was undertaken at dawn, dusk and/or after dark. All call files were obtained from BOCA or NATURESOUND.

Duration: twenty-seven evenings/dusks and six dawns [17th January 2018 – 1st May 2019]

MEGAPHONE DEPLOYED AT DUSK TARGETING THREATENED AVIFAUNA

The approximate locations of fauna survey plots (for defined methods such as camera trapping, call playback, anabat location etc.) across the study area are depicted in **Figure 13**.

Table 18: Flora and Fauna Survey Effort Summary

Method	Target Species	Survey Effort	Number of site/units	Dates
Habitat Assessment	All fauna and flora	2 persons x 2 days	Multiple sites	12/12/2017 & 18/12/2017
BAM Vegetation Integrity Plots	-	40 Plots	40	08/03/2018 – 01/05/2019
Threatened Flora Surveys	All flora including the following threatened plant species: Marblewood (*Acacia bakeri*); Hairy Jointgrass (*Arthraxon hispidus*); Needle-leaf Fern (*Belvisia mucronate*); Yellow Satinheart (*Bosistoa transversa*); Native Jute (*Corchorus cunninghamii*); Corokia (*Corokia whiteana*); Davidson's Plum (*Davidsonia jerseyana*); Smooth Davidson's Plum (*Davidsonia johnsonii*); Thorny Pea (*Desmodium acanthocladum*); Small-leaved Tamarind (*Diploglottis campbellii*); Hairy Quandong (*Elaeocarpus williamsianus*); Crystal Creek Walnut (*Endiandra floydii*); Rusty Rose Walnut (*Endiandra hayesii*); Green-leaved Rose Walnut (*Endiandra muelleria subsp. bracteata*); Red Boppel Nut (*Hicksbeachia pinnatifolia*); Rough-shelled Bush Nut (*Macadamia tetraphylla*); Slender Marsdenia (*Marsdenia longiloba*); Rusty Plum (*Niemeyera whitei*); Yellow-flowered King of the Fairies (*Oberonia complanata*);	2 x persons x 13 days (opportunistic during other surveys)	Proposed Development Footprint + ~30m buffer	04/12/2018 17/01/2019 19/02/2019 21/02/2019 26/02/2019 28/02/2019 14/03/2019 25/03/2019 26/03/2019 1/04/2019 3/04/2019 12/04/2019 16/04/2019

Method	Target Species	Survey Effort	Number of site/units	Dates
	Onion Cedar (*Owenia cepiodora*); Spiny Gardenia (*Randia moorei*); Scrub Turpentine (*Rhodamnia rubescens*); Native Guava (*Rhodomyrtus psidioides*) Rainforest Cassia (*Senna acclinis*); Brush Sophora (*Sophora fraseri*); Red Lilly Pilly (*Syzygium hodgkinsoniae*); and Durobby (*Syzygium moorei*)			
ANABAT Microbat Surveys	Microbat species and the following threatened species: Large-eared Pied Bat (*Chalinolobus dwyeri*); Little Bentwing-bat (*Miniopterus australis*); Eastern Bentwing-bat (*Miniopterus schreibersii ocaeanensis*); Southern Myotis (*Myotis macropus*); and Eastern Cave Bat (*Vespadelus troughtoni*)	43 recorded nights (1830- 0400)	6 sites	12/12/2017 - 17/02/2018
Nocturnal Spotlighting	Nocturnal fauna species and the following threatened species: Eastern Pygmy-possum (*Cercartetus nanus*); Green-thighed Frog (*Litoria brevipalmata*); Parma Wallaby (*Macropus parma*); Giant Barred Frog (*Mixophyes iteratus*) Barking Owl (*Ninox connivens*); Powerful Owl (*Ninox strenua*); Squirrel Glider (*Petaurus norfolcencis*); Brush-tailed Phascogale (*Phascogale tapoatafa*);	27 nights (2 persons x 2 hours per night)	Multiple sites	17/01/2018 23/01/2018 01/02/2018 07/02/2018 15/02/2018 21/02/2018 01/03/2018 08/03/2018

Method	Target Species	Survey Effort	Number of site/units	Dates
	Koala (*Phascolarctos cinereus*); Long-nosed Potoroo (*Potorous tridactylus*) Grey-headed Flying-fox (*Pteropus poliocephalus*); Masked Owl (*Tyto novaehollandiae*); and Sooty Owl (*Tyto tenebricosa*)			20/03/2018 22/08/2018 23/08/2018 20/09/2018 04/10/2018 24/10/2018 01/11/2018 8/11/2018 14/11/2018 04/11/2018 09/01/2019 17/01/2019 18/02/2019 21/02/2019 28/02/2019 26/03/2019 01/04/2019 3/04/2019 01/05/2019

Method	Target Species	Survey Effort	Number of site/units	Dates
Dusk Stag Watching	Targeting the following nocturnal species: Eastern Pygmy-possum (*Cercartetus nanus*); Glossy Black-cockatoo (*Calyptorhynchus lathami*); Barking Owl (*Ninox connivens*); Powerful Owl (*Ninox strenua*); Squirrel Glider (*Petaurus norfolcensis*) Brush-tailed Phascogale (*Phascogale tapoatafa*); Masked Owl (*Tyto novaehollandiae*); and Sooty Owl (*Tyto tenebricosa*)	2 persons x 27 dusks	Multiple Sites	As per nocturnal spotlighting
Motion Triggered Cameras	All fauna species	115 nights	72 sites	12/12/2017 - 20/03/2018 & 18/02/2019 - 7/03/2019
Hair Funnel Survey	Small mammals including the following threatened species: Brush-tailed Phascogale (*Phascogale tapoatafa*); Long-nosed Potoroo (*Potorous tridactylus*) and Common Planigale (*Planigale maculata*)	28 nights	37 sites	01/02/2018 - 01/03/2018
Reptile Surveys	Reptile species and the following threatened species: White-crowned Snake (*Cacophis harriettae*); Pale-headed Snake (*Hoplocephalus bitorquatus*); and Stephens' Banded Snake (*Hoplocephalus stephensii*)	2 persons x 30 minutes	10 sites	19/02/2019 – 26/03/2019
Dawn/Dusk Bird Survey	Avifauna species and the following threatened species: Glossy Black-cockatoo (*Calyptorhynchus lathami*); White-eared Monarch (*Carterornis leucotis*);	2 persons x 27 dusks/6 dawns	Multiple Sites	As per nocturnal spotlighting

Method	Target Species	Survey Effort	Number of site/units	Dates
	Comb-crested Jacana (*Irediparra gallinacea*); Barking Owl (*Ninox connivens*); Powerful Owl (*Ninox strenua*); Masked Owl (*Tyto novaehollandiae*); and Sooty Owl (*Tyto tenebricosa*)			
Amphibian Waterbody Assessment	Amphibians including the following threatened species: Green-thighed Frog (*Litoria brevipalmata*); and Giant Barred Frog (*Mixophyes iteratus*)	2 persons x 45 minutes	15 sites	1st February 2018 - 21st February 2019
Call Playback	As stated within '*Nocturnal Survey Methodology*' above	2 persons x 27 dusks/evenings 6 dawns	Multiple Sites	As per nocturnal spotlighting

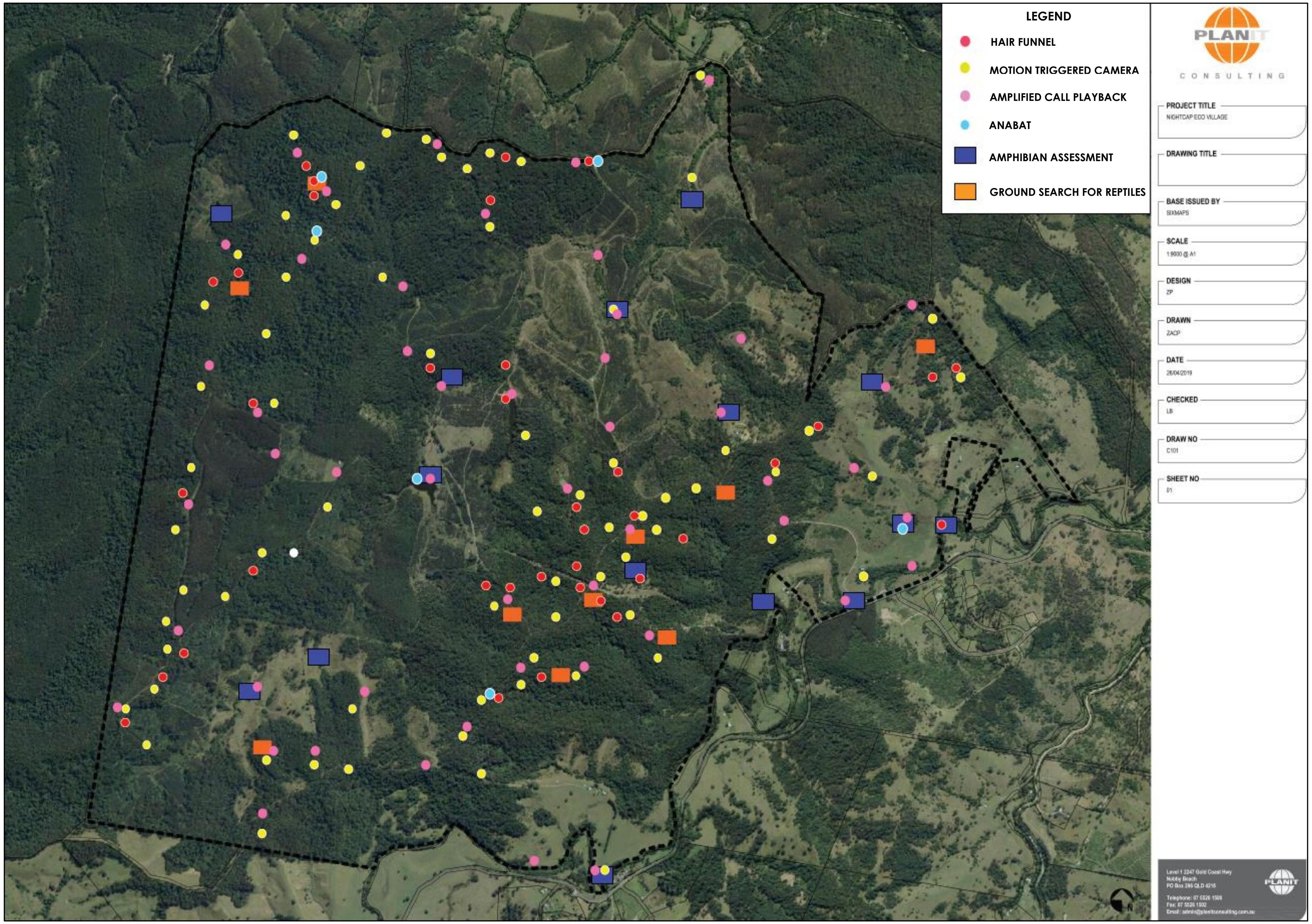

LEGEND
HAIR FUNNEL
MOTION TRIGGERED CAMERA
AMPLIFIED CALL PLAYBACK
ANABAT
AMPHIBIAN ASSESSMENT
GROUND SEARCH FOR REPTILES
PLANIT
CONSULTING
PROJECT TITLE
NIGHTCAP ECO VILLAGE
DRAWING TITLE
BASE ISSUED BY
SIXMAPS
SCALE
1:9000 @ A1
DESIGN
ZP
DRAWN
ZACP
DATE
26/04/2019
CHECKED
LB
DRAW NO
C101
SHEET NO
01
Level 1 2247 Gold Coast Hwy
Nobby Beach
PO Box 296 QLD 4218
Telephone: 07 5526 1500
Fax: 07 5526 1502
Email : admin@planitconsulting.com.au
PLANIT
N

Figure 13: Fauna Survey Map

4.4.1 Weather Conditions during Survey

The following weather conditions (sourced from BOM) were recorded during onsite survey works during the survey period at Murwillumbah (Bray Park) {station 056037} approximately 18km from the subject site.

Table 19: Weather Conditions During Onsite Survey Works

Date	Daily Data				Monthly Data			
	Min-Max Temp. (C°)	Rainfall	Wind (direction and speed)	Relative Humidity	Min-Max Temp (mean) (C°)	Rainfall (total)	Wind (speed)	Relative Humidity (mean)
12 December 2017	18.7-27.8	0mm	NW 28km/h	54%	19.4-29.7	142.1mm	-	75%
18 December 2017	19.4-29.0	0mm	SW 19km/h	55%				
17 January 2018	16.4-28.2	0mm	NW 35km/h	48%	19.7-30.7	73.0mm	-	71%
23 January 2018	19.3-30.8	0mm	SW 20km/h	58%				
1 February 2018	na-23.0	7.0mm	N 24km/h	65%	20.0-29.3	177.4mm	-	78%
7 February 2018	na-28.1	0mm	NW 30km/h	48%				
15 February 2018	22.5-32.9	0mm	NW 24km/h	63%				
21 February 2018	20.7-27.5	3.0mm	NW 30km/h	48%				
1 March 2018	18.6-35.3	0mm	-	-	19.6-28.5	204.3mm	8km/h	65%
8 March 2018	19.2-26.7	5.0mm	SE 9km/h	58%				
20 March 2018	20.4-29.4	0mm	NE 11km/h	57%				
22 August 2018	0.3-24.0	0	E 11km/h	30%	6.6-23.7	42.5mm	11km/h	44%
23 August 2018	4.4-22.2	0mm	E 9km/h	45%				
20 September 2018	11.9-24.8	0mm	SE 15km/h	61%	11.9-23.8	50.0mm	12km/h	61%
27 September 2018	13.6-22.3	15.8mm	S 6km/h	68%				
4 October 2018	10.7-26.9	0mm	NE 19km/h	64%	15.7-25.2	310.0mm	9km/h	68%
24 October 2018	16.8-31.9	0mm	NE 19km/h	56%				
1 November 2018	14.1-28.4	0mm	NE 9km/h	-	16.1-28.8	37.8mm	11km/h	81%

Date	Daily Data				Monthly Data			
	Min-Max Temp. (C°)	Rainfall	Wind (direction and speed)	Relative Humidity	Min-Max Temp (mean) (C°)	Rainfall (total)	Wind (speed)	Relative Humidity (mean)
8 November 2018	22.2-23.2	0mm	SE 11km/h	86%				
14 November 2018	13.5-26.8	0mm	E 7km/h	92%				
27 November 2018	14.3-29.1	0mm	NE 6km/h	85%				
28 November 2018	21.2-35.5	0mm	SE 11km/h	66%				
3 December 2018	21.1-29.3	0mm	SE 19km/h	61%	18.6-29.0	140.8mm	10km/h	64%
4 December 2018	16.7-29.3	0mm	E 7km/h	61%				
9 January 2019	19.8-32.0	0mm	NE 15km/h	70%	19.5-31.3	2.4mm	16km/h	62%
17 January 2019	17.8-31.1	0mm	-	-				
18 February 2019	17.5-30.7	0mm	ENE 13km/h	60%	20.2-29.9	43.1mm	16km/h	64%
19 February 2019	17.2-32.4	0mm	NNE 7km/h	69%				
21 February 2019	23.0-31.2	0mm	SSE 15km/h	60%				
28 February 2019	18.5-25.7	2.0mm	NE 15km/h	62%				
6 March 2019	18.2-31.5	0mm	NE 6km/h	67%	20.0-29.6	175.8mm	9km/h	69%
14 March 2019	21.8-29.8	0mm	NE 2km/h	76%				
25 March 2019	20.6-34.7	0mm	NNE 22km/h	57%				
26 March 2019	23.0-30.5	0mm	-	65%				
1 April 2019	12.6-25.5	0mm	S 15km/h	49%	15.8-26.1	143.1mm	9km/h	71%
3 April 2019	17.6-24.3	26.2mm	SW 4km/h	80%				
12 April 2019	15.0-24.7	5.0mm	WSW 4km/h	89%				
16 April 2019	15.9-25.3	0mm	-	-				
1 May 2019	17.7-24.3	1.8	S	91	N/A	N/A	N/A	N/A

Date	Daily Data				Monthly Data			
	Min-Max Temp. (C°)	Rainfall	Wind (direction and speed)	Relative Humidity	Min-Max Temp (mean) (C°)	Rainfall (total)	Wind (speed)	Relative Humidity (mean)
			7km/h					

4.4.2 Survey Limitations

Whilst the duration of flora surveys and inspections of the property are considered appropriate, it was not practical to intensively search all areas of the subject site (~1584ha). Additional undetected threatened or other native flora species may be present within the site (particularly weed species within highly disturbed areas). Targeted flora survey was conducted during nominated survey periods for all species credits species considered to potentially occur within the development footprint in accordance with OEH flora survey guidelines. Given the extremely large area of the subject site (>1500ha), it was not practical to conduct targeted surveys over the entire property. Targeted surveys focused on the nominated development footprint buffered by approximately 30m. Opportunistic flora surveys were conducted during other survey methods.

The duration and sampling methodology of the fauna survey is considered appropriate for the subject site. The year-long survey effort targeted fauna species credit species during their nominated survey timeframes (as per the BAM calculator) in accordance with recognized State and Federal fauna survey guidelines. It is accepted that although assessments of habitat and species ecology does provide an additional measure to anticipate the presence of species (as a surrogate for its actual observation), there is no absolute certainty to the absence of a species from marginal or potential habitat.

Additionally, there may be some species that may utilise the habitats within the site but have remained undetected due to their rarity, elusive nature or the sporadic utilisation of the habitats (i.e. the Long-nosed Potoroo, Common Planigale and Dunnart are elusive species that are difficult to trap or observe directly; the Black-necked Stork, Powerful Owl, Spotted-tail Quoll and Red Goshawk may only visit an area occasionally within a much larger home-range; the Swift Parrot and Regent Honeyeater may only visit an area during peak flowering periods etc.).

The conclusions of this report are therefore based upon data available at the time and the results of field works undertaken and are therefore indicative of the environmental condition of the site at the time of sampling, including the presence or otherwise of species. It should be acknowledged that site conditions, including the presence of threatened species, can change over time. Additionally, flora and fauna results from previous ecological studies of the locality were considered.

The above limitations have been taken into account and the likelihood of threatened such species occurring within the site assessed through habitat assessment, records of the species within the locality and aspects of species ecology.

4.5 Recorded Threatened Species

A total of twenty-one (21) threatened fauna and seven (7) threatened flora species were recorded within the study area of the site.

The locations of these recorded threatened species have been provided within **Figure 14** and **Figure 15**.

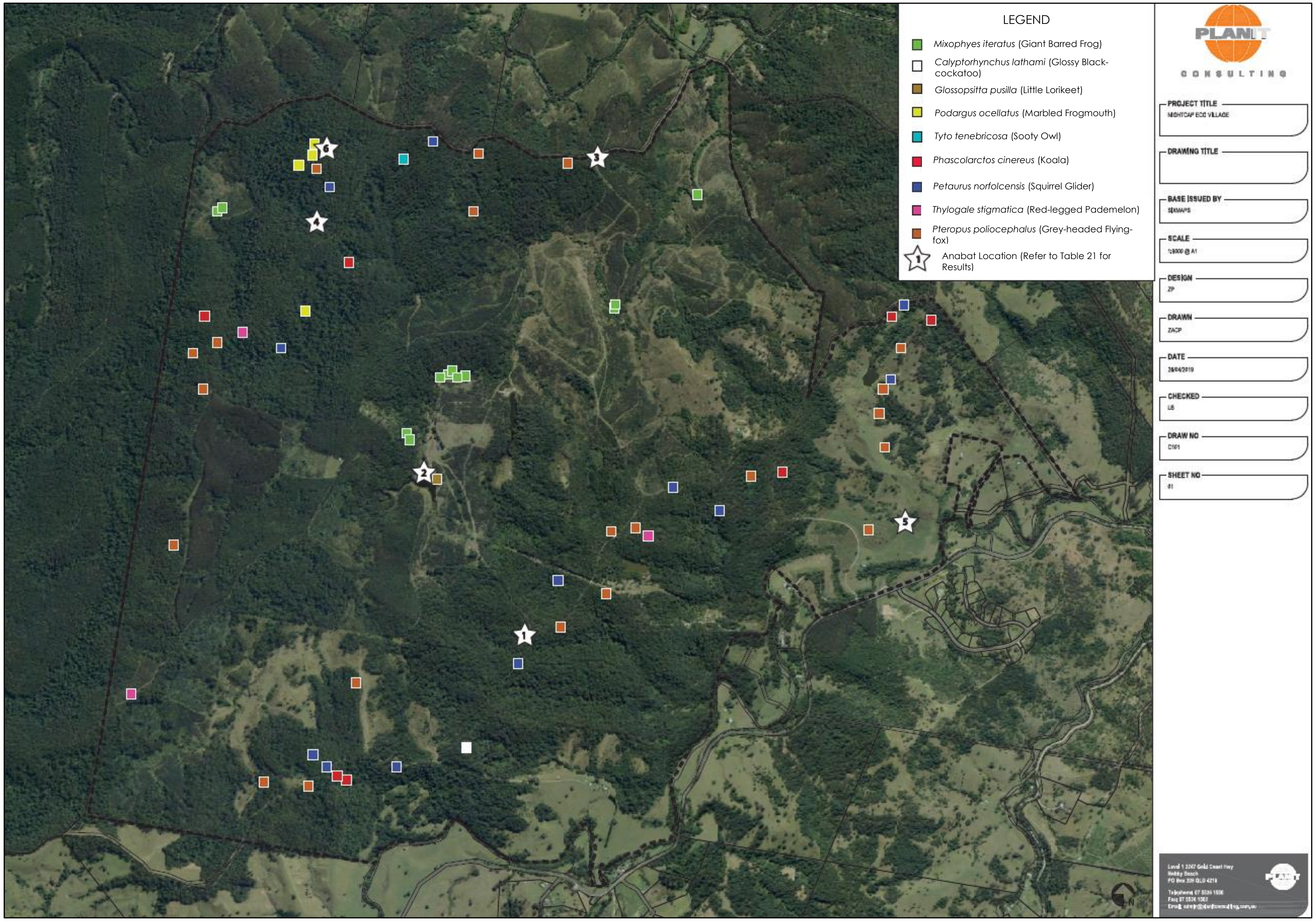

LEGEND
🟩 *Mixophyes iteratus* (Giant Barred Frog)
☐ *Calyptorhynchus lathami* (Glossy Black-cockatoo)
🟫 *Glossopsitta pusilla* (Little Lorikeet)
🟨 *Podargus ocellatus* (Marbled Frogmouth)
🟦 *Tyto tenebricosa* (Sooty Owl)
🟥 *Phascolarctos cinereus* (Koala)
🟦 *Petaurus norfolcensis* (Squirrel Glider)
🟪 *Thylogale stigmatica* (Red-legged Pademelon)
🟧 *Pteropus poliocephalus* (Grey-headed Flying-fox)
☆ Anabat Location (Refer to Table 21 for Results)
1
2
3
4
5
6
N
PROJECT TITLE
NIGHTCAP ECO VILLAGE
DRAWING TITLE
BASE ISSUED BY
SIXMAPS
SCALE
1:9000 @ A1
DESIGN
ZP
DRAWN
ZACP
DATE
28/04/2019
CHECKED
LB
DRAW NO
C101
SHEET NO
01
Level 1 2247 Gold Coast Hwy
Nobby Beach
PO Box 206 QLD 4218
Telephone: 07 5526 1500
Fax: 07 5526 1502
Email: admin@planitconsulting.com.au

Figure 14: Threatened Fauna Records

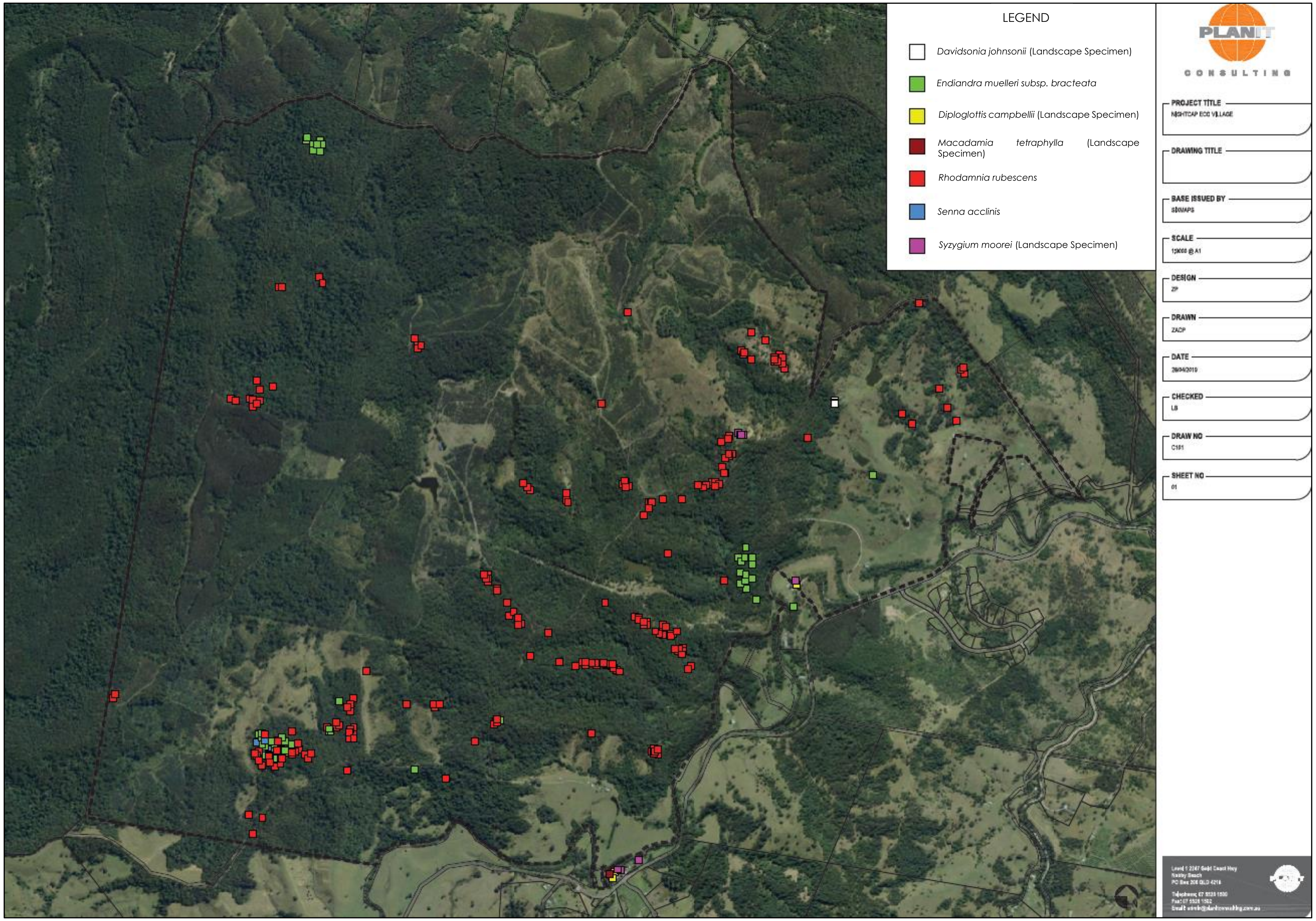

LEGEND
☐ *Davidsonia johnsonii* (Landscape Specimen)
🟩 *Endiandra muelleri subsp. bracteata*
🟨 *Diploglottis campbellii* (Landscape Specimen)
🟥 *Macadamia tetraphylla* (Landscape Specimen)
🟥 *Rhodamnia rubescens*
🟦 *Senna acclinis*
🟪 *Syzygium moorei* (Landscape Specimen)
PROJECT TITLE
NIGHTCAP ECO VILLAGE
DRAWING TITLE
BASE ISSUED BY
SIXMAPS
SCALE
1:9000 @ A1
DESIGN
ZP
DRAWN
ZACP
DATE
26/04/2019
CHECKED
LB
DRAW NO
C101
SHEET NO
01

Figure 15: Threatened Flora Records

Table 20: Recorded Threatened Microbat Locations (Refer to Figure 16 for Area Locations)

Anabat Location	Threatened Microbat Species Recorded
Area 1	• East Coast Freetail-bat (*Mormopterus norfolkensis*) • Large-eared Pied Bat (*Chalinolobus dwyeri*) • Hoary Wattled Bat (*Chalinolobus nigrogriseus*) • Little Bent-wing Bat (*Miniopterus australis*) • Unidentified Long-eared Bat (*Nyctophilius sp*)* • Large Bent-wing Bat (*Miniopterus orianae oceanensis*) • Greater Broad-nosed Bat (*Scoteanax rueppellii*)
Area 2	• East Coast Freetail-bat (*Micronomus norfolkensis*) • Large-eared Pied Bat (*Chalinolobus dwyeri*) • Hoary Wattled Bat (*Chalinolobus nigrogriseus*) • Little Bent-wing Bat (*Miniopterus australis*) • Unidentified Long-eared Bat (*Nyctophilius sp*)* • Large Bent-wing Bat (*Miniopterus orianae oceanensis*) • Greater Broad-nosed Bat (*Scoteanax rueppellii*) • Southern Myotis (*Myotis macropus*) • Eastern Cave Bat (*Vespadelus troughtoni*)
Area 3	• East Coast Freetail-bat (*Micronomus norfolkensis*) • Large-eared Pied Bat (*Chalinolobus dwyeri*) • Hoary Wattled Bat (*Chalinolobus nigrogriseus*) • Little Bent-wing Bat (*Miniopterus australis*) • Unidentified Long-eared Bat (*Nyctophilius sp*)* • Large Bent-wing Bat (*Miniopterus orianae oceanensis*) • Eastern Cave Bat (*Vespadelus troughtoni*)
Area 4	• East Coast Freetail-bat (*Micronomus norfolkensis*) • Hoary Wattled Bat (*Chalinolobus nigrogriseus*) • Little Bent-wing Bat (*Miniopterus australis*) • Unidentified Long-eared Bat (*Nyctophilius sp*)* • Large Bent-wing Bat (*Miniopterus orianae oceanensis*) • Greater Broad-nosed Bat (*Scoteanax rueppellii*)
Area 5	• East Coast Freetail-bat (*Micronomus norfolkensis*) • Hoary Wattled Bat (*Chalinolobus nigrogriseus*) • Little Bent-wing Bat (*Miniopterus australis*) • Southern Myotis (*Myotis macropus*) • Unidentified Long-eared Bat (*Nyctophilius sp*)* • Large Bent-wing Bat (*Miniopterus orianae oceanensis*)
Area 6	• East Coast Freetail-bat (*Micronomus norfolkensis*) • Large-eared Pied Bat (*Chalinolobus dwyeri*) • Little Bent-wing Bat (*Miniopterus australis*) • Unidentified Long-eared Bat (*Nyctophilius sp*)* • Large Bent-wing Bat (*Miniopterus orianae oceanensis*)

* An unidentified Nyctophilus species was regularly recorded via ANABAT survey efforts. As there are local records of the *Nyctophilus bifax* it is considered probable that this species was recorded.

4.6 Threatened Species Polygons and Biodiversity Risk Weighting

In accordance with Section 6.4.1.33 of the BAM, species polygons must be mapped for each species credit species identified with the development site.

Species habitat polygons have been prepared for the recorded species (credit species only) within the development site (**Table 21**). The conceptual polygons are shown within **Figure 16** and **Figure 17** below.

Table 21: Recorded Threatened Species Polygons and Biodiversity Risk Weighting

Species	Biodiversity Risk Weighting	Species Habitat Polygon Description
Fauna		
Large-eared Pied Bat* (*Chalinolobus dwyeri*)	3	All areas of PCT 812 Zone 1, PCT 812 Zone 2 and PCT 1073 Zone 1
Southern Myotis (*Myotis macropus*)	2	Areas of PCT 812 Zone 1, PCT 812 Zone 2 and PCT 1073 Zone 1 within 200m of Open Water
Squirrel Glider (*Petaurus norfolcensis*)	2	All areas of PCT 812 Zone 1, PCT 812 Zone 2 and PCT 1073 Zone 1
Koala (*Phascolarctos cinereus*)	2	All areas of PCT 812 Zone 1, PCT 812 Zone 2 and PCT 1073 Zone 1
Eastern Cave Bat* (*Vespadelus troughtoni*)	3	All areas of PCT 812 Zone 1, PCT 812 Zone 2 and PCT 1073 Zone 1
Flora		
Green-leaved Rose Walnut (Endiandra muelleri subsp. bracteata)	2	All areas of PCT 812 Zone 1, PCT 812 Zone 2 and PCT 1073 Zone 1. Refer to Figure 16 for recorded locations
Scrub Turpentine (*Rhodamnia rubescens*)	3	All areas of PCT 812 Zone 1, PCT 812 Zone 2 and PCT 1073 Zone 1. Refer to Figure 16 for recorded locations.
Rainforest Senna (*Senna acclinis*)	2	Areas of PCT 1073 Zone 1 containing regenerating rainforest within the understory. Refer to Figure 16 for recorded locations.

* Both the Large-eared Pied Bat (*Chalinolobus dwyeri*) and Eastern Cave Bat (*Vespadelus troughtoni*) were recorded on numerous occasions via Anabat throughout the subject site. No suitable roosting or breeding habitat occurs on site for either these species. The development footprint does not occur within 2km of rocky areas containing caves, overhangs, escarpments, outcrops, crevices, old mines or tunnels. A species polygon has been prepared for foraging habitat for these species. Impacts are equivalent to impacts on ecosystem credits.

While Smooth Davidson's Plum (*Davidsonia johnsonii*), Small-leaved Tamarind (*Diploglottis campbellii*), Rough-shelled Bush Nut (*Macadamia tetraphylla*) and Durobby (*Syzygium moorei*) were recorded within the study area, these specimens are landscape specimens and have been planted amongst other ornamental/landscape species. The majority of these specimens are external to the proposed development footprint. Several Durobby (*Syzygium moorei*) were recorded within a yard proximate to a dwelling on Lot 34 DP755714 which are currently within the proposed development footprint. An additional Durobby (*Syzygium moorei*) and a Small-leaved Tamarind (*Diploglottis campbellii*) were recorded amongst other landscape/ornamental species within the Outward Bound Australia land. As these are planted specimens, no species habitat polygon was drawn for this species.

The Giant Barred Frog (*Mixophyes iteratus*) was recorded in several sites within the subject site (refer to **Figure 14** for locations). The development footprint does not occur within 50m of semi-permanent and permanent drainages where the species were recorded. As such, no species habitat polygons or offsets is required for the Giant Barred Frog as a result of the proposal.

The number of Scrub Turpentine (*Rhodamnia rubescens*) occurring throughout the overall subject site is considered to be significantly more than what has been mapped within **Figure 15** (in particularly the retained areas within the northern half the site). Given the significant size of the overall site, surveys for this species were targeted areas proximate to the proposed development footprint.

The species polygons for recorded threatened flora and fauna species have been provided below.

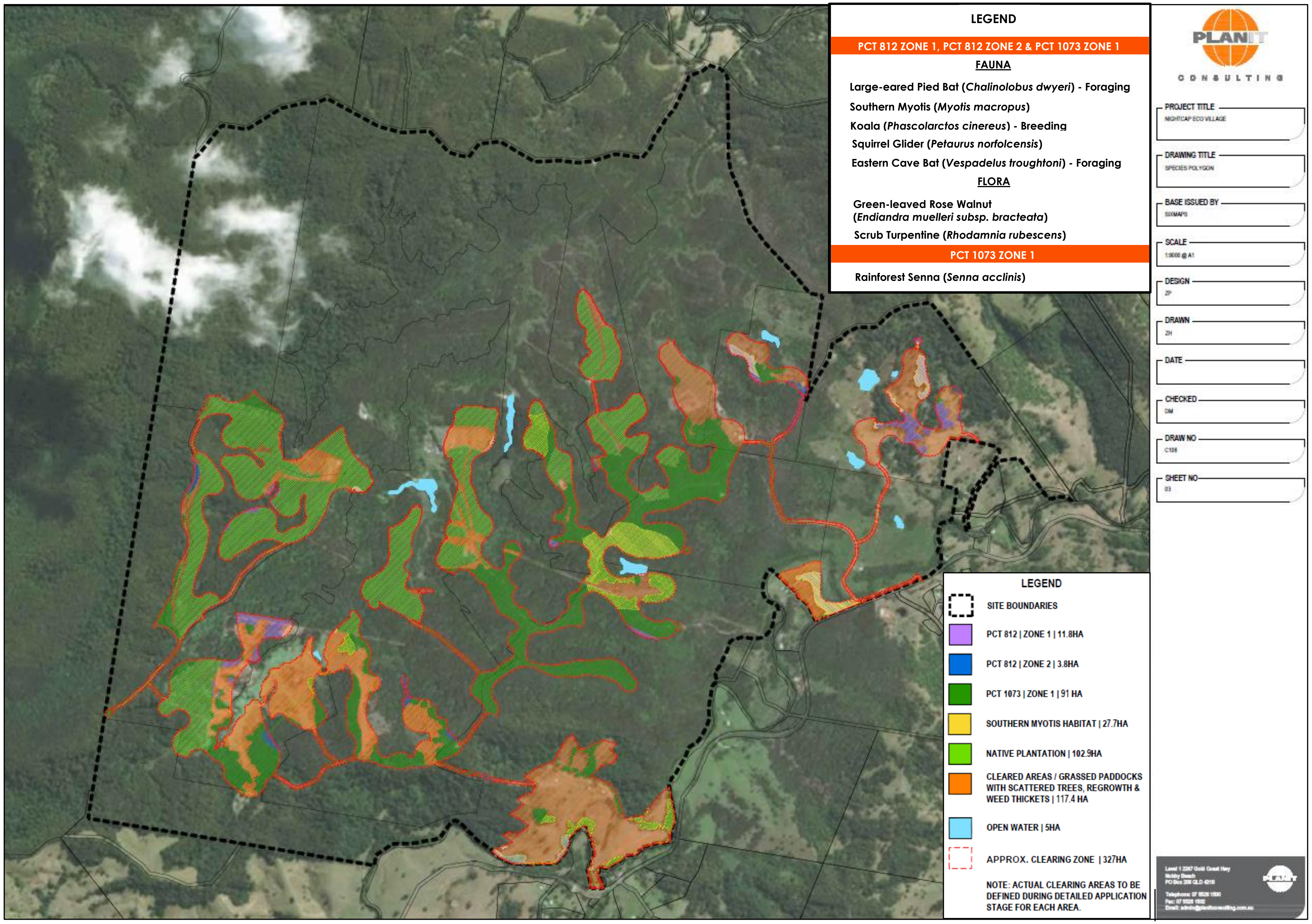

LEGEND
PCT 812 ZONE 1, PCT 812 ZONE 2 & PCT 1073 ZONE 1
FAUNA
Large-eared Pied Bat (*Chalinolobus dwyeri*) - Foraging
Southern Myotis (*Myotis macropus*)
Koala (*Phascolarctos cinereus*) - Breeding
Squirrel Glider (*Petaurus norfolcensis*)
Eastern Cave Bat (*Vespadelus troughtoni*) - Foraging
FLORA
Green-leaved Rose Walnut (*Endiandra muelleri subsp. bracteata*)
Scrub Turpentine (*Rhodamnia rubescens*)
PCT 1073 ZONE 1
Rainforest Senna (*Senna acclinis*)
LEGEND
SITE BOUNDARIES
PCT 812 | ZONE 1 | 11.8HA
PCT 812 | ZONE 2 | 3.8HA
PCT 1073 | ZONE 1 | 91 HA
SOUTHERN MYOTIS HABITAT | 27.7HA
NATIVE PLANTATION | 102.9HA
CLEARED AREAS / GRASSED PADDOCKS WITH SCATTERED TREES, REGROWTH & WEED THICKETS | 117.4 HA
OPEN WATER | 5HA
APPROX. CLEARING ZONE | 327HA
NOTE: ACTUAL CLEARING AREAS TO BE DEFINED DURING DETAILED APPLICATION STAGE FOR EACH AREA.
PLANIT CONSULTING
PROJECT TITLE
NIGHTCAP ECO VILLAGE
DRAWING TITLE
SPECIES POLYGON
BASE ISSUED BY
SIXMAPS
SCALE
1:9000 @ A1
DESIGN
ZP
DRAWN
ZH
DATE
CHECKED
DM
DRAW NO
C106
SHEET NO
03
Level 1 2247 Gold Coast Hwy
Nobby Beach
PO Box 206 QLD 4218
Telephone: 07 5526 1500
Fax: 07 5526 1502
Email: admin@planitconsulting.com.au

Figure 16: Species Polygons for Recorded Threatened Species (Species Credit Species)

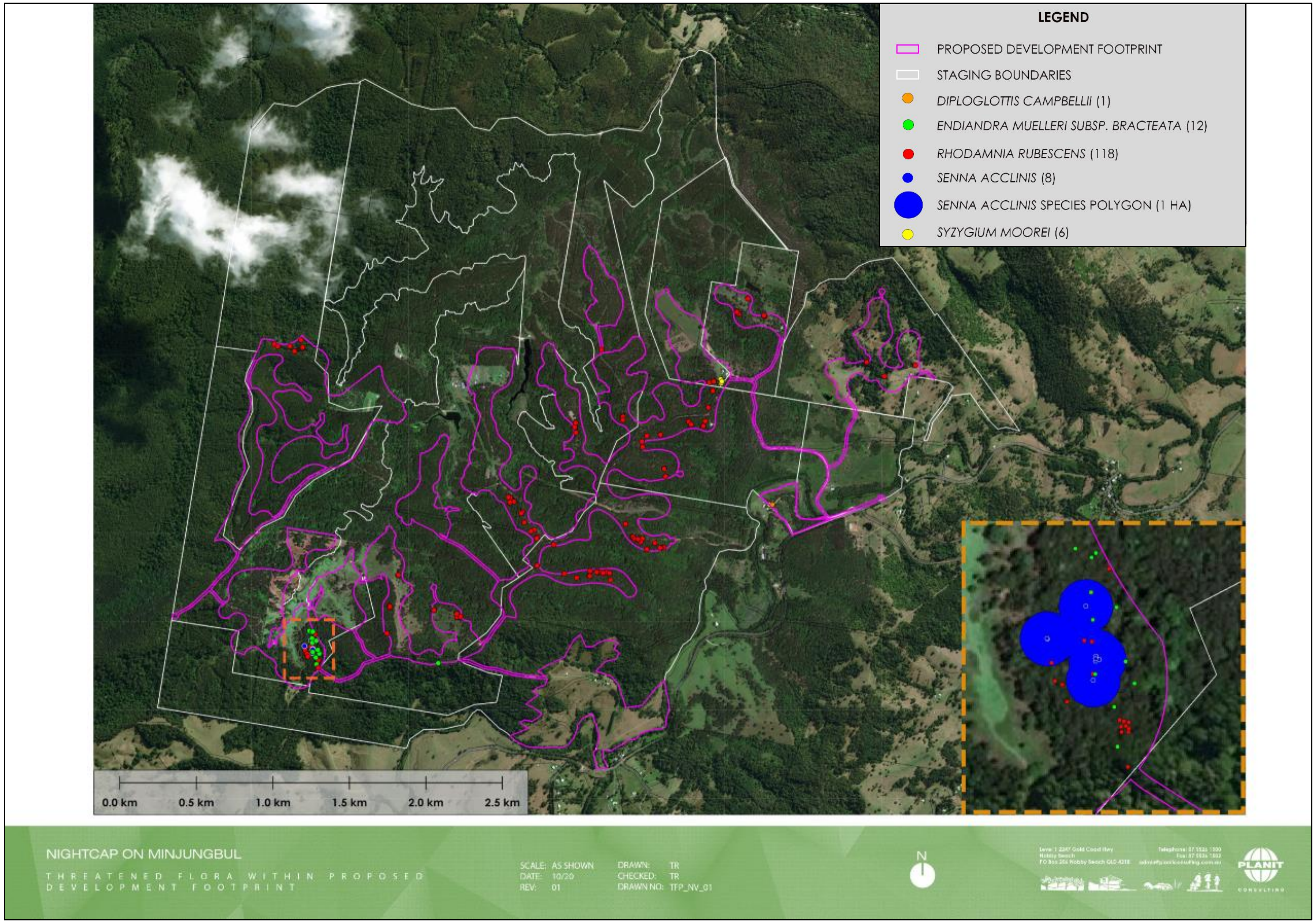

LEGEND
PROPOSED DEVELOPMENT FOOTPRINT
STAGING BOUNDARIES
DIPLOGLOTTIS CAMPBELLII (1)
ENDIANDRA MUELLERI SUBSP. BRACTEATA (12)
RHODAMNIA RUBESCENS (118)
SENNA ACCLINIS (8)
SENNA ACCLINIS SPECIES POLYGON (1 HA)
SYZYGIUM MOOREI (6)
0.0 km
0.5 km
1.0 km
1.5 km
2.0 km
2.5 km
NIGHTCAP ON MINJUNGBUL
THREATENED FLORA WITHIN PROPOSED DEVELOPMENT FOOTPRINT
SCALE: AS SHOWN
DATE: 10/20
REV: 01
DRAWN: TR
CHECKED: TR
DRAWN NO: TFP_NV_01
N
PLANIT
CONSULTING

Figure 17: Threatened Flora Species Recorded Within Proposed Works Footprint

4.7 Prescribed Biodiversity Values

Section 6.7 of the BAM notes the following as 'prescribed biodiversity values':

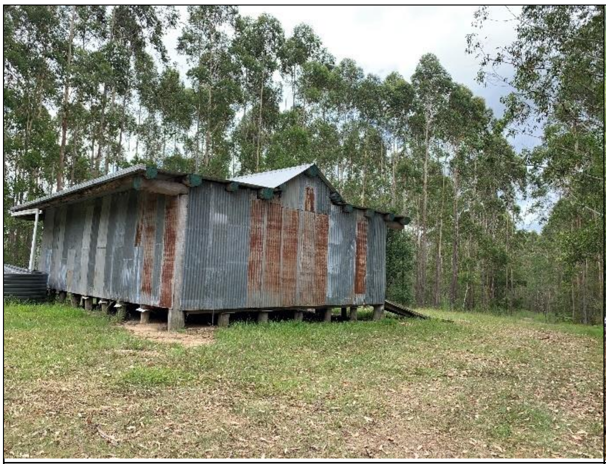
- Karst, caves, crevices and cliffs;
- Occurrences of rock;
- Human made structures and non-native vegetation (deemed to be habitat for threatened species or ecological community);
- Watercourses of hydrological processes that interact with rivers and streams; and
- Wind farms.

No karsts, caves, crevices or cliffs occur within the subject site.

While the site does contain some surface rocks (associated with watercourses and gullies), it is considered that these areas does not provide core habitat for threatened species occurring within the subject site. These rocky areas are proposed to be retained and are abundant throughout the surrounding areas.

The subject site contains numerous human-made structures which includes dwellings, shelters, sheds, fencing, cabins, roads, bridges and viewing platforms.

Searches beneath river crossing bridges and shelters failed to observe any microbat usage (or any other threatened species).


SHELTER WITHIN THE SITE

EXISTING BRIDGE CROSSING OVER THE TWEED RIVER

Non-native vegetation is abundant throughout the site, in particularly Lantana (*Lantana camara*) and exotic grasses. It is considered that these areas do not provide habitat for threatened species occurring within the site.

Reviewing the above, it is considered that the human made structures and non-native vegetation occurring within the subject site does not represent habitat for threatened species or ecological community.

The site contains numerous drainage lines, watercourses and waterbodies (both natural and man-made) as discussed within **Section 2.1.4** and **Section 2.1.5**.

The proposed development not for a wind farm.

5 Impact Assessment (Biodiversity Values and Prescribed Impacts)

This section details the potential impacts of the proposed development on biodiversity values in accordance with Stage 2 of the BAM.

The proposed development would result in direct impacts on native biota and their habitats within the site. There is also the potential for indirect impacts on retained areas of native vegetation within and adjacent to the subject site, both during construction and from the resulting operation of the subdivision.

Mitigation measures are recommended to minimise potential impacts on biodiversity values. These measures are presented according to the hierarchy of avoidance and mitigation of impacts, and the provision of offsets to compensate residual impacts of the proposal that cannot be avoided or mitigated.

5.1 Avoiding and Minimising Impacts on Biodiversity Values

5.1.1 Locating a Project to Avoid and Minimise Impacts on Native Vegetation and Habitat

The proposed development's avoid and minimise strategy is provided within **Table 22** below. The key features of the proposal's avoid and minimise strategy is summerised below.

A year-long ecological study has occurred over the subject site. This study occurred over the entire subject site which resulted in the proposed development footprint being nominated. Areas considered to represent higher ecological values have been retained. Other constraints such as slope, future dam inundation areas and accessibility were also considered while determining the proposed development footprint areas.

The ecological constraints analysis recommended that the areas of the subject site that have been identified with high ecological constraints are considered to be areas where development should be avoided and protected

The proposal footprint has aimed to avoid and protect areas considered to represent higher ecological values within the subject site (i.e. TECs) and utilise cleared/modified areas and plantation as much as possible. More than 67% of the proposed development footprint occurs on already cleared/modified areas (including plantation).

A total of ~106.58ha of native vegetation (PCT 1073 & PCT 812) is proposed to be cleared by the proposal. A further ~220.3ha of cleared/modified areas will also be impacted by the project. These figures are a 'worst-case scenario' sum and will be significantly reduced at the more detailed design phase of the development as dwellings are more clustered together than what's currently proposed.

More than 80% (>800ha) of the subject site's native vegetation is proposed to be retained and protected. It is anticipated that the majority of retained areas will be subject to a future Biodiversity Stewardship Agreement. These areas will be subject to management plans which will be detailed within a future Biodiversity Stewardship Site Assessment Report (BSSAR). This will enhance biodiversity values within these areas, as well as provide adequate protection.

Existing tracks and roads have been utilised throughout the development footprint to minimise impacts. Existing tracks and roads vary in width from approximately 2m up to 10m in width (photos below). With approximately 26.5km of road upgrades/new roads (6m wide) required to facilitate the proposal, utilizing existing roads/tracks has reduced the required clearing rates significantly.

EXISTING ROADS TO BE UTILISED AS INTERNAL ROADS FOR THE PROPOSAL

EXISTING TRACKS TO BE UTILISED AS INTERNAL ROADS FOR THE PROPOSAL

Existing crossing locations over the Tweed River will be exploited to minimise potential disturbances and clearing associated bridge upgrade works. These areas are already largely cleared and dominated by exotic species (photos below). Management plans (i.e. sediment and erosion control plan, vegetation management plan, construction environmental management plan etc.) will be prepared and implemented during the constructions phase to ensure downstream impacts are mitigated.

EXISTING BRIDGE TO BE UPGRADED PROXIMATE THE OUTWARD BOUND CENTRE

EXISTING BRIDGE ON MANDALAY ROAD

Local fauna movement will be retained with over 800ha of connected native vegetation proposed for retention within the subject site. It is considered that this area is sufficient in size to retain fauna movement opportunities between local habitats. Additionally, the proposed restoration works would provide additional habitat over time to facilitate movements of local fauna. These areas connect the site with neighbouring remnant vegetation and National Parks, allowing fauna movement opportunities across the broad landscape. Clearing is likely to be staged over several years which will allow fauna to relocate and establish into retained areas of the site.

Areas of the site have been nominated as being located within a 'regional corridor' (refer to **Figure 9**) which links Mebbin National Park to Nightcap National Park. Such is connected to Border Ranges

National Park and Wollumbin National Park. The 'regional corridor' occurring through the site traverse significant areas of plantation areas which are dominated by Lantana (*Lantana camara*). These areas provide low ecological values and likely to hinder movement opportunities for non-volant fauna species given its extreme density.

Additionally, the proposed future dam inundation area (refer to **Figure 4**) traverses this existing 'regional corridor' and will diminish movement opportunities for ground-dwelling species who are reluctant to swim.

As stated within **Section 2.1.6** and illustrated within **Figure 9**, a more suitable location for the 'regional corridor' occurs along the southern portions of the site which eventually re-connects to the existing 'regional corridor'. These areas are external to the proposed future dam inundation areas and proposal footprint and are in good condition.

A series of management plans will be prepared at the D.A stage which is to be implemented during the construction and operational phase of the proposal. These plans include (but not limited to) Vegetation Management Plan, Sediment and Erosion Control Plan, Stormwater Management Plan, Fauna Management Plan, Construction Environmental Management Plan, Bushfire Management Plan and Waste Management Plan.

Nest boxes are proposed to be installed to offset the removal of hollow-bearing trees. Where possible, hollow ground-logs found within the development footprint is to be relocated within retained areas of the site.

Unavoidable impacts as a result of the development will be offset in accordance with the Biodiversity Offset Scheme (BOS).

Table 22: Avoiding and Minimising Impacts on Biodiversity Values

Item	APPROACH	MITIGATION MEASURE	DESCRIPTION
	LOCATING THE PROJECT TO AVOID AND MINIMISE IMPACTS ON NATIVE VEGETATION		
1	Locating the project in areas where there are no biodiversity values	The development footprint has been located within areas of the site containing lower biodiversity values and retaining areas representing higher ecological values.	It is not possible to locate the proposal in an area where there are no biodiversity values. A year-long ecological study has occurred over the subject site. This study occurred over the entire subject site which resulted in the proposed development footprint being nominated. Areas considered to represent higher ecological values have been retained. Other constraints such as slope, future dam inundation areas and accessibility were also considered while determining the proposed development footprint. The ecological constraints analysis recommended that the areas of the subject site that have been identified with high ecological constraint are considered to be areas where development should be avoided and protected. The proposal footprint has aimed to avoid and protect areas considered to represent higher ecological values within the subject site (i.e. TECs) and utilise cleared/modified areas and plantation as much as possible. Existing roads and tracks have also been utilised to minimize clearing. Existing crossing locations over the Tweed River will be used to minimise potential disturbances and clearing associated bridge upgrade works. Areas mapped as containing Biodiversity Values in accordance with NSW Government's Biodiversity Value Map has been largely avoided. The majority of mapped Biodiversity Value areas which occur within the proposed development footprint are already cleared or contains plantation. Biodiversity Value areas associated with the Tweed River have also been largely protected by utilizing existing access points. The majority of these areas are dominated by weed

Item	APPROACH	MITIGATION MEASURE	DESCRIPTION
			species (in particularly privets, camphor laurel and exotic grasses) and will be subject to future restoration works. The subject site does not contain any Areas of Outstanding Biodiversity Value (AOBV).
2	Locating the project in areas where the native vegetation or threatened species habitat is in the poorest condition (i.e. areas that have a lower vegetation integrity score).	The development footprint has been located to take advantage of existing disturbances associated with the agricultural history of the site and occur on land where native vegetation has a low vegetation integrity score.	The proposal would result in impacts to ~106.58ha of native vegetation but has avoided more than 800ha of native vegetation that could have yielded additional dwellings within the site. The proposed development footprint targeted existing modified/cleared areas and plantation where possible. These areas are generally dominated by exotic species and are in poor condition. Whilst areas representing threatened species habitat is proposed to be modified/removed, more than 80% of similar native vegetation will be retained and protected. Where possible, potential habitat for threatened species (i.e. hollow logs) will be relocated into adjacent retained areas. Mitigation measures such as restoration works, revegetation and nest box installation are proposed to ensure there's sufficient threatened species habitat occurring within the site. Unavoidable impacts to threatened species habitat will be offset in accordance with the Biodiversity Offset Scheme (BOS).
3	Locating the project in areas that avoid habitat for species that have a high biodiversity risk weighting or native vegetation that is critically endangered ecological	The proposal has been designed as far as possible to avoid and minimise impacts to threatened species habitat and avoid threatened ecological communities.	As previously stated, existing cleared/modified areas of the subject site have been exploited for the development footprint. This includes utilsing existing roads and tracks for proposed roads and exploiting existing crossings over the Tweed River. This reduces clearing habitat for threatened species occurring within the site.

Item	APPROACH	MITIGATION MEASURE	DESCRIPTION
	community (CEEC) or an endangered ecological community (EEC).		Within the subject site, PCT 1302 (White Booyong – Fig subtropical rainforest of the NSW North Coast Bioregion) is potentially reflective of 'Lowland Rainforest in the NSW North Coast and Sydney Basin Bioregion', an Endangered Ecological Community (EEC) under the *Biodiversity Conservation Act (2016)* and 'Lowland Rainforest of Subtropical Australia', a Critically Endangered Ecological Community (CEEC) under the *Environment Protection and Biodiversity Conservation Act (1999)*. The proposed development footprint has entirely avoided these areas and are proposed for future restoration and protection. No SAIIs occur as a result of the proposal which are likely to contribute significantly to the risk of extinction of any threatened species or ecological community. Further discussions regarding SAIIs are provided within **Section 5.2.4** below. Proposed management plans will be prepared as a part of a Stewardship Agreement to restore and increase biodiversity values within retained areas of the site. Additional management plans will also be prepared and implemented during the construction and operational phase to ensure potential impacts upon retained areas are avoided. These may include (but not limited to) Vegetation Management Plan, Sediment and Erosion Control Plan, Stormwater Management Plan, Fauna Management Plan, Construction Environmental Management Plan, Bushfire Management Plan and Waste Management Plan.
4	Locating the project such that connectivity enabling movement of species and genetic material between areas of adjacent or nearby habitat is maintained.	The proposal does not significantly impact on regional and sub-regional connectivity values	The proposed development footprint targeted existing modified/cleared areas and plantation where possible, retaining more than 80% of the site's native vegetation. Areas of the site have been nominated as being located within a 'regional corridor' which links Mebbin National Park to Nightcap National Park. Such is connected to Border Ranges National Park and Wollumbin National Park. The

Item	APPROACH	MITIGATION MEASURE	DESCRIPTION
			'regional corridor' occurring through the site traverse significant areas of plantation areas which are dominated by Lantana (*Lantana camara*). These areas provide low ecological values and likely to hinder movement opportunities for non-volant fauna species given its extreme density. The proposed future dam inundation area traverses this existing 'regional corridor' and will diminish movement opportunities for ground-dwelling species who are reluctant to swim. A more suitable location for the 'regional corridor' occurs along the southern portions of the site which eventually re-connects to the existing 'regional corridor'. These areas are external to the proposed future dam inundation areas and are in good condition. Future restoration and revegetation work within areas currently bare and/or dominated by exotic species is proposed within retained areas of the site. This will enhance connectivity through areas where connectivity values are currently low.
DESIGNING A PROJECT TO AVOID AND MINIMISE IMPACTS ON NATIVE VEGETATION AND HABITAT			
5	Reducing the clearing footprint of the project	The clearing and works footprint will be reduced to retain areas of higher ecological significance	The proposal footprint has aimed to avoid and protect areas considered to represent higher ecological values within the subject site (i.e. TECs) and utilise cleared/modified areas and plantation as much as possible. Existing roads, tracks and river crossings have also been exploited to minimize the clearing footprint. More than 80% (>800ha) of the subject site's native vegetation is proposed to be retained and protected. These areas will be subject to future restoration and revegetation works to increase ecological values.

Item	APPROACH	MITIGATION MEASURE	DESCRIPTION
6	Locating ancillary facilities in areas where there are no biodiversity values	Proposed ancillary facilities has been located within areas of the site containing lower biodiversity values	It is not possible to locate the proposal in an area where there are not biodiversity values. The proposed development footprint targeted existing modified/cleared areas and plantation where possible. These areas are generally dominated by exotic species and are in poor condition. The proposal has avoided areas of TECs and retained more than 80% of the site's native vegetation. All equipment and materials required for construction will not be permitted within areas of the site proposed for retention. These areas are to be protected in accordance with Australian Standards 4970-2009 Protection of Trees on Development Sites. Impacts associated with installing ancillary facilities have been minimized through the following: Existing roads and tracks have also been utilised to minimize clearing. Existing crossing locations over the Tweed River will be used to minimise potential disturbances and clearing associated bridge upgrade works. All dwellings are to be serviced by onsite rainwater collection with supplementary imported water supply through water tankers. All sites are to be serviced by on-site sewage systems. Precise Environmental P/L has prepared a Concept On-site Sewage Management Design Report (COSMD) for the proposal. It is proposed power to dwellings and community buildings will be provided through roof mounted solar panels and battery storage.

Item	APPROACH	MITIGATION MEASURE	DESCRIPTION
			No street lighting is planned for the development, to minimise environmental impact of lighting on the natural setting and fauna. Gas services are proposed through cylinder delivery while telecommunication services are proposed via connection to existing telecommunications cables. The development shall aim to reduce, reuse and recycle waste, through minimal waste impact and sustainable dwelling typologies. It is envisioned that individual dwellings would contain sufficient compost, recycling and general waste storage with compost areas and standard wheelie bins (1 general waste and 1 recycling waste bin per dwelling). Waste will then be transferred to specifically located communal storage points by either an internal managed service or (as appropriate) by the individual dwelling residents (depending on distance, volume etc.). Storage points would be appropriately designed to cater for the volume of waste depending on the number of dwellings serviced. Additional screening and suitable washdown facilities would also be provided to reduce the opportunities for odours and vermin impact. The intention is then for waste to be transferred by an internal managed service to a single central collection point close to the future village centre and Kyogle Road for collection by a reputable waste collector such as Solo Waste. A detailed review of available options and formation of a suitable waste storage and collection strategy will be provided through subsequent DA stages. Unavoidable impacts as a result of the development will be offset in accordance with the Biodiversity Offset Scheme (BOS).

Item	APPROACH	MITIGATION MEASURE	DESCRIPTION
7	Locating ancillary facilities in areas where the native vegetation or threatened species habitat is in the poorest condition (i.e. areas that have a lower vegetation integrity score).	Proposed ancillary facilities have been located to take advantage of existing disturbances associated with the agricultural history of the site and occur on land where native vegetation have lower ecological values	Refer to Item 6 response.
8	Locating ancillary facilities in areas that avoid habitat for species and vegetation in high threat status categories (e.g. an CEEC or EEC)	Ancillary facilities have been designed as far as possible to avoid and minimise impacts to on site EEC and threatened species habitat.	Refer to Item 6 response.
9	Providing structures to enable species and genetic material to move across barriers or hostile gaps.	Where possible structures will be provided to enable connectivity for species with mitigation measures proposed for potential threats	Local fauna movement will be retained with over 800ha of connected native vegetation proposed for retention within the subject site. It is considered that this area is sufficient in size to retain fauna movement opportunities between local habitats. Additionally, the proposed restoration works would provide additional habitat over time to facilitate movements of local fauna. These areas connect the site with neighbouring remnant vegetation and National Parks, allowing fauna movement opportunities across the broad landscape. Unrestrained domestic animals within the retained open space areas of the site shall be prohibited in future to reduce potential for future predation or harassing of native animals. No free-roaming of domestic animals would be permitted within the proposed open space areas which is to be designated 'on-leash' only. The topography of the subject site will ensure internal roads are low speed to minimize potential vehicle strikes. Signage is to be installed along the roadways of the site warning drivers of the presence of wildlife.

Item	APPROACH	MITIGATION MEASURE	DESCRIPTION
			All new swimming pools must incorporate a design component such as a shallow ramp and/or a stout rope (minimum 50mm diameter), one end of which must be secured to a stable poolside fixture, the other end of which must trail in the pool at all times. Nest boxes are proposed to be installed to offset the removal of hollow-bearing trees. Where possible, hollow logs found within the development footprint is to be relocated within retained areas of the site.
10	Making provision for the demarcation, ecological restoration, rehabilitation and/or ongoing maintenance of retained native vegetation habitat on the development site.	Retain and protect areas designated for retention. Rehabilitate areas of the subject site which are proposed for retention.	The ecological constraints analysis which occurred throughout the year-long study recommended that the areas of the subject site that have been identified with high ecological constraint are considered to be areas where development should be avoided and protected. The proposal footprint has aimed to avoid and protect areas considered to represent higher ecological values within the subject site (i.e. TECs) and utilise cleared/modified areas and plantation as much as possible. Existing roads tracks and river crossings have also been utilised to minimize impacts. It is anticipated that the majority of retained areas will be subject to a future Biodiversity Stewardship Agreement. These areas will be subject to management plans which will be detailed within a future Biodiversity Stewardship Site Assessment Report (BSSAR). This will enhance biodiversity values within these areas, as well as provide adequate protection. A Preliminary Rehabilitation Plan has been prepared within **Appendix 6**. This conceptual rehabilitation plan provides preliminary measures on how to restore and rehabilitate areas which are currently in lesser condition. A more detailed rehabilitation plan will be provided within the future BSSAR.

Item	APPROACH	MITIGATION MEASURE	DESCRIPTION
			The Koala Habitat Protection Guideline used to implement *SEPP (Koala Habitat Protection) 2020* is now in effect, being enacted in November 2020 following the 2019 SEPP being rescinded. A Koala Plan of Management (KPoM) will be prepared at the first subdivision D.A (Stage 2). The future KPoM will utilise the finalised criteria and principles within the *Koala Habitat Protection Guideline*. Areas of the site proposed for retention will be protected in accordance with *Australian Standards 4970-2009 Protection of Trees on Development Sites* where they are in close proximity to work areas. Nest boxes are proposed to be installed to offset the removal of hollow-bearing trees. No trees within the site proposed for retention are to be removed without the consent from Council. Unavoidable impacts as a result of the development will be offset in accordance with the Biodiversity Offset Scheme (BOS).

5.1.2 Avoiding and Minimising Prescribed Impacts

Section 6.1 of the *Biodiversity Conservation Regulation 2017* notes the following as prescribed impacts:

- impacts on the habitat of threatened species or ecological communities associated with karst, caves, crevices, cliffs and other geological features of significance, rocks, human-made structures or non-native vegetation.
- impacts on the connectivity of different areas of habitat of threatened species that facilitates the movement of those species across their range.
- impacts of development on water quality, water bodies and hydrological processes that sustain threatened species and threatened ecological communities.
- impacts of wind turbine strikes on protected animals impacts of vehicle strikes on threatened species or on animals that are part of a TEC.

Potential impacts and mitigation measures regarding the abovementioned potentially occurring prescribed impacts are provided within **Section 5.2.4**.

5.2 Assessment of Impacts on Native Vegetation and Habitat

5.2.1 Preliminary Direct Impacts

Clearing of vegetation will be the major direct impact associated with the intended development. Direct impact includes the loss of vegetation and fauna habitats as a result of clearing works in order to facilitate works required for the proposal.

The ultimate proposal would result in direct impacts on ~106.58ha of native vegetation zones (PCT 812 Zone 1, PCT 812 Zone 2 and PCT 1073 Zone 1). In addition to this, the proposal would result in the removal of ~220.3ha of non-native/modified areas of the site. This includes areas of plantation and cleared/grassed paddocks.

A summary of the proposed conceptual clearing rates for the development footprint is tabulated below. A conceptual Vegetation Clearing Plan has also been prepared which illustrates the areas proposed for clearing/modification (refer to **Figure 18**).

Table 23: Conceptual Clearing Rates as a Result of the Overall Proposal

Vegetation Zone	Approx. extent within subject site (ha)	Approx. extent to be cleared\modified (ha)	Approx. extent to be retained (ha)	Approx. % remaining
PCT 812 | Zone 1	263.1	11.8	251.3	95.5
PCT 812 | Zone 2	79.7	3.8	75.9	95.2
PCT 1073 | Zone 1	590.2	91	499.2	84.58
PCT 1302	5.5	0	5.5	100
Plantation	338	102.9	235.1	69.6
Camphor Laurel Dominant Closed to Open Forest	5.6	0	5.6	100
Cleared Areas/Grassed Paddocks with Scattered Trees, Regrowth & Weed Thickets	297	117.4	179.6	60.47
Open Water	5	0	5	100
Total	**1584.1**	326.9	1257.2	79.36

The above clearing rates are at a 'worst case scenario' and is considered to be significantly reduced at the D.A stage. As the proposal will be staged, the impacts and associated retirement of credits is also proposed to be staged. Credit offset requirements will be retired prior to the construction/clearing activies for the relevant stage. The following table provides the conceptual clearing areas per clearing/construction phase of the development.

Table 24: Conceptual Clearing Rates Per Stage

Stage	Vegetation Zone	Approx. extent to be cleared/modified (ha)
1	PCT 812 | Zone 1	1.7676
	PCT 812 | Zone 2	0.1942
	PCT 1073 | Zone 1	-
	Plantation	0.0605
	Cleared Areas/Grassed Paddocks with Scattered Trees, Regrowth & Weed Thickets	3.2325
3	PCT 812 | Zone 1	-
	PCT 812 | Zone 2	0.1924
	PCT 1073 | Zone 1	22.1161
	Plantation	2.3589
	Cleared Areas/Grassed Paddocks with Scattered Trees, Regrowth & Weed Thickets	0.2481
4	PCT 812 | Zone 1	0.4939
	PCT 812 | Zone 2	1.1534
	PCT 1073 | Zone 1	25.6597
	Plantation	0.5012
	Cleared Areas/Grassed Paddocks with Scattered Trees, Regrowth & Weed Thickets	38.7909
5	PCT 812 | Zone 1	-
	PCT 812 | Zone 2	-
	PCT 1073 | Zone 1	3.5146
	Plantation	-
	Cleared Areas/Grassed Paddocks with Scattered Trees, Regrowth & Weed Thickets	9.1746
6	PCT 812 | Zone 1	0.1779
	PCT 812 | Zone 2	0.0887

Stage	Vegetation Zone	Approx. extent to be cleared/modified (ha)
	PCT 1073 | Zone 1	11.9806
	Plantation	16.8094
	Cleared Areas/Grassed Paddocks with Scattered Trees, Regrowth & Weed Thickets	2.6458
7	PCT 812 | Zone 1	0.1378
	PCT 812 | Zone 2	-
	PCT 1073 | Zone 1	7.3716
	Plantation	13.1838
	Cleared Areas/Grassed Paddocks with Scattered Trees, Regrowth & Weed Thickets	6.3927
8	PCT 812 | Zone 1	0.0299
	PCT 812 | Zone 2	0.6275
	PCT 1073 | Zone 1	9.2057
	Plantation	11.8465
	Cleared Areas/Grassed Paddocks with Scattered Trees, Regrowth & Weed Thickets	11.4152
9	PCT 812 | Zone 1	3.1617
	PCT 812 | Zone 2	0.4544
	PCT 1073 | Zone 1	8.2267
	Plantation	17.7669
	Cleared Areas/Grassed Paddocks with Scattered Trees, Regrowth & Weed Thickets	23.3514
10	PCT 812 | Zone 1	0.4529
	PCT 812 | Zone 2	0.1883
	PCT 1073 | Zone 1	1.7595
	Plantation	40.4219
	Cleared Areas/Grassed Paddocks with Scattered Trees, Regrowth & Weed Thickets	3.2885
11	PCT 812 | Zone 1	4.5116
	PCT 812 | Zone 2	0.2135
	PCT 1073 | Zone 1	0.0101
	Plantation	-
	Cleared Areas/Grassed Paddocks with Scattered Trees, Regrowth & Weed Thickets	14.7651
12	PCT 812 | Zone 1	1.0773
	PCT 812 | Zone 2	0.6693
	PCT 1073 | Zone 1	1.1412
	Plantation	-
	Cleared Areas/Grassed Paddocks with Scattered Trees, Regrowth & Weed Thickets	4.0635

As above, species credit species required to be retired have also been divided into stages. Recorded species credit species impacts areas are provided below:

Table 25: Species Credit Species Per Stage

Stage	Species	Area / Count
1	Fauna (PCT 812 Zone 1, PCT 812 Zone 2 & PCT 1073 Zone 1) Large-eared Pied Bat (*Chalinolobus dwyeri*) – Foraging Koala (*Phascolarctos cinereus*) – Breeding Squirrel Glider (*Petaurus norfolcensis*)	1.9618ha

	Eastern Cave Bat (*Vespadelus troughoni*) – Foraging	
	Southern Myotis (*Myotis macropus*)	1.9618ha
	*Durobby (*Syzygium moorei*)	1
	Small-leaved Tamarind (*Diploglottis campbellii*)	1
3	Fauna (PCT 812 Zone 1, PCT 812 Zone 2 & PCT 1073 Zone 1) Large-eared Pied Bat (*Chalinolobus dwyeri*) – Foraging Koala (*Phascolarctos cinereus*) – Breeding Squirrel Glider (*Petaurus norfolcensis*) Eastern Cave Bat (*Vespadelus troughoni*) – Foraging	22.3103ha
	Southern Myotis (*Myotis macropus*)	6.0132ha
	Scrub Turpentine (*Rhodamnia rubescens*)	13
4	Fauna (PCT 812 Zone 1, PCT 812 Zone 2 & PCT 1073 Zone 1) Large-eared Pied Bat (*Chalinolobus dwyeri*) – Foraging Koala (*Phascolarctos cinereus*) – Breeding Squirrel Glider (*Petaurus norfolcensis*) Eastern Cave Bat (*Vespadelus troughoni*) – Foraging	27.3070ha
	Southern Myotis (*Myotis macropus*)	7.8811ha
	Scrub Turpentine (*Rhodamnia rubescens*)	34
5	Fauna (PCT 812 Zone 1, PCT 812 Zone 2 & PCT 1073 Zone 1) Large-eared Pied Bat (*Chalinolobus dwyeri*) – Foraging Koala (*Phascolarctos cinereus*) – Breeding Squirrel Glider (*Petaurus norfolcensis*) Eastern Cave Bat (*Vespadelus troughoni*) – Foraging	3.5146ha
	Scrub Turpentine (*Rhodamnia rubescens*)	3
	*Durobby (*Syzygium moorei*)	5
6	Fauna (PCT 812 Zone 1, PCT 812 Zone 2 & PCT 1073 Zone 1) Large-eared Pied Bat (*Chalinolobus dwyeri*) – Foraging Koala (*Phascolarctos cinereus*) – Breeding Squirrel Glider (*Petaurus norfolcensis*) Eastern Cave Bat (*Vespadelus troughoni*) – Foraging	12.2472ha
	Southern Myotis (*Myotis macropus*)	3.8073ha
	Scrub Turpentine (*Rhodamnia rubescens*)	9
7	Fauna (PCT 812 Zone 1, PCT 812 Zone 2 & PCT 1073 Zone 1) Large-eared Pied Bat (*Chalinolobus dwyeri*) – Foraging Koala (*Phascolarctos cinereus*) – Breeding Squirrel Glider (*Petaurus norfolcensis*) Eastern Cave Bat (*Vespadelus troughoni*) – Foraging	7.5094ha
	Southern Myotis (*Myotis macropus*)	2.6874ha
	Scrub Turpentine (*Rhodamnia rubescens*)	15
8	Fauna (PCT 812 Zone 1, PCT 812 Zone 2 & PCT 1073 Zone 1) Large-eared Pied Bat (*Chalinolobus dwyeri*) – Foraging Koala (*Phascolarctos cinereus*) – Breeding Squirrel Glider (*Petaurus norfolcensis*) Eastern Cave Bat (*Vespadelus troughoni*) – Foraging	9.8631ha
	Southern Myotis (*Myotis macropus*)	0.6745ha
	Scrub Turpentine (*Rhodamnia rubescens*)	9
	Green-leaved Rose Walnut (*Endiandra muelleri subsp. bracteata*)	1
9	Fauna (PCT 812 Zone 1, PCT 812 Zone 2 & PCT 1073 Zone 1) Large-eared Pied Bat (*Chalinolobus dwyeri*) – Foraging Koala (*Phascolarctos cinereus*) – Breeding Squirrel Glider (*Petaurus norfolcensis*) Eastern Cave Bat (*Vespadelus troughoni*) – Foraging	11.8428ha
	Southern Myotis (*Myotis macropus*)	0.4579ha

	Scrub Turpentine (*Rhodamnia rubescens*)	17
	Green-leaved Rose Walnut (*Endiandra muelleri subsp. bracteata*)	11
	Rainforest Senna (*Senna acclinis*)	1ha
10	Fauna (PCT 812 Zone 1, PCT 812 Zone 2 & PCT 1073 Zone 1) Large-eared Pied Bat (*Chalinolobus dwyeri*) – Foraging Koala (*Phascolarctos cinereus*) – Breeding Squirrel Glider (*Petaurus norfolcensis*) Eastern Cave Bat (*Vespadelus troughoni*) – Foraging	2.4007ha
	Scrub Turpentine (*Rhodamnia rubescens*)	8
11	Fauna (PCT 812 Zone 1, PCT 812 Zone 2 & PCT 1073 Zone 1) Large-eared Pied Bat (*Chalinolobus dwyeri*) – Foraging Koala (*Phascolarctos cinereus*) – Breeding Squirrel Glider (*Petaurus norfolcensis*) Eastern Cave Bat (*Vespadelus troughoni*) – Foraging	4.7352ha
	Southern Myotis (*Myotis macropus*)	1.4587ha
	Scrub Turpentine (*Rhodamnia rubescens*)	3
12	Fauna (PCT 812 Zone 1, PCT 812 Zone 2 & PCT 1073 Zone 1) Large-eared Pied Bat (*Chalinolobus dwyeri*) – Foraging Southern Myotis (*Myotis macropus*) Koala (*Phascolarctos cinereus*) – Breeding Squirrel Glider (*Petaurus norfolcensis*) Eastern Cave Bat (*Vespadelus troughoni*) – Foraging	2.8878ha
	Southern Myotis (*Myotis macropus*)	0.7660ha
	Scrub Turpentine (*Rhodamnia rubescens*)	7

* Planted Specimens

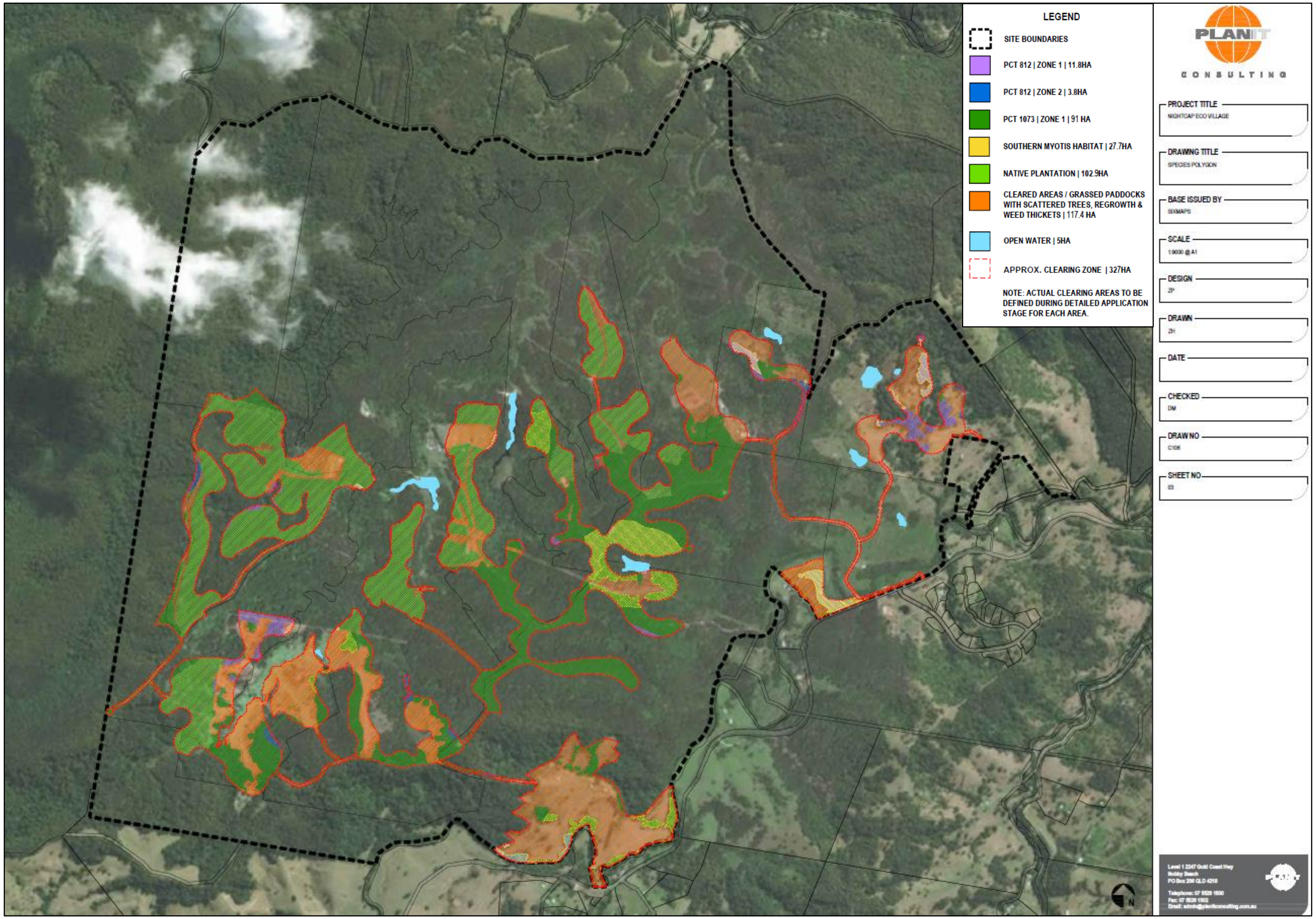

LEGEND
SITE BOUNDARIES
PCT 812 | ZONE 1 | 11.8HA
PCT 812 | ZONE 2 | 3.8HA
PCT 1073 | ZONE 1 | 91 HA
SOUTHERN MYOTIS HABITAT | 27.7HA
NATIVE PLANTATION | 102.9HA
CLEARED AREAS / GRASSED PADDOCKS WITH SCATTERED TREES, REGROWTH & WEED THICKETS | 117.4 HA
OPEN WATER | 5HA
APPROX. CLEARING ZONE | 327HA
NOTE: ACTUAL CLEARING AREAS TO BE DEFINED DURING DETAILED APPLICATION STAGE FOR EACH AREA.
PLANIT CONSULTING
PROJECT TITLE
NIGHTCAP ECO VILLAGE
DRAWING TITLE
SPECIES POLYGON
BASE ISSUED BY
SIXMAPS
SCALE
1:9000 @ A1
DESIGN
ZP
DRAWN
ZH
DATE
CHECKED
DM
DRAW NO
C106
SHEET NO
03
Level 1 2247 Gold Coast Hwy
Nobby Beach
PO Box 206 QLD 4218
Telephone: 07 5526 1500
Fax: 07 5526 1502
Email: admin@planitconsulting.com.au
N

Figure 18: Conceptual Clearing Plan

5.2.2 Hollow Bearing Trees

Gibbons and Lindenmayer (2002) estimate that 303 native vertebrate species utilise tree hollows of which approximately 100 are listed as rare or threatened within State or Commonwealth Legislation. Research conducted by the Department of Natural Resources (1998) estimates that 134 of these species potentially utilise tree hollows in SE Queensland. Given that hollow bearing potential is low for Eucalypts below 120-180 years of age (with older trees required for larger fauna) and the fact that many species require a variety of different hollows within their home range (particularly arboreal mammals), hollow bearing trees represent a limited ecological resource (Gibbons & Lindenmayer, 2002).

Within the subject site there exists numerous hollow bearing trees (HBT) estimated at >1000 trees bearing one or more hollows (it is acknowledged that additional trees with hollows that are not readily visible at ground level may occur and that not all areas of the subject site where physically traversed). Residual trees within paddocks containing hollows were also observed.

A review by Gibbons and Lindenmayer (2002) on tree hollows in Australia found that hollow bearing tree densities in logged and unlogged eucalypt forests in far-northern NSW ranged between 6 and 10 HBTs/ha, whereas In the wet and dry sclerophyll forests of south east Queensland, density was slightly greater, ranging between 6.6 to 13.2 HBTs per ha.

Whilst hollow-bearing trees are abundant within the site, historical logging throughout the area is evident with cut stumps commonly observed throughout the overall site. An old timber milling station is present within the Bhula Bhula site.

Given the large size of the site and that the proposal is only at a conceptual stage, hollow-bearing trees occurring within the subject site have not yet been plotted. Once detailed plans have been prepared for the D.A stage, delineating the works footprint, all hollow-bearing trees are to be surveyed and located. The locations of each hollow-bearing trees occurring within the development footprint will be provided within subsequent D.A ecological reporting with adequate compensatory measures provided.

Compensatory measures include erecting suitable nest-boxes throughout the retained areas of the site. The nest boxes are to be installed prior to the commencement of clearing works. Where possible, fallen hollows are to be recycled and re-used for more nest-boxes or hollow ground-logs. It is recommended that a minimum compensatory ratio of 1:1 (gain/loss) per hollow is applied.

To potentially allow for a wider range of species to utilise the provided fauna boxes it is recommended that boxes be designed in accordance with a variety of specifications. In particular, the following is to be provided targeting a range of arboreal mammals and avifauna:

- small insect bat box
- medium standard fauna nest box for gliders/parrots
- large fauna boxes for Brushtail possum/small cockatoo
- extra-large fauna boxes for owls/large cockatoo

The purchase, installation and monitoring of the above fauna boxes should comply with the below requirements:

- Fauna boxes are only to be sourced from a reputable supplier;
- Boxes are to be well-insulated, rainproof and facing away from prevailing winds and direct midday summer sunlight;
- Boxes are to be installed on rough barked trees of a younger age that do not already bear hollows;
- Boxes are to be located where casual access is difficult to reduce potential vandalism; and

- Boxes are to be maintained and inspected on an annually basis.

Measures should also be taken to reduce the likelihood of feral competitors moving into the nest boxes. For feral bees, carpet can be attached to the underside of the box lid to prevent them forming a hive.

The GPS locations of the installed nest boxes are to be provided within the first annual progress report.

5.2.3 Indirect Impacts

Indirect impacts which may occur on site if not adequately managed includes:

- Weeds and Pathogens;
- Rubbish dumping;
- Increase in predatory species populations;
- Increased risk of fire;
- Sedimentation run-off;
- Vehicle strikes;
- Noise & Vibration;
- Dust;
- Light Spill;
- Damage to Retained Native Vegetation; and
- Native Fauna Mortality/Injury

Measures to mitigate and manage the abovementioned potentially occurring indirect impacts are discussed later on within **Table 27**.

As a result of the indirect risk assessment, it was determined that residual risk following the implementation of mitigation measures was low to very low.

5.2.4 Assessing Prescribed Biodiversity Impacts

Section 6.1 of the *Biodiversity Conservation Regulation 2017* notes the following as prescribed impacts:

- impacts on the habitat of threatened species or ecological communities associated with karst, caves, crevices, cliffs and other geological features of significance, rocks, human-made structures or non-native vegetation.

- impacts on the connectivity of different areas of habitat of threatened species that facilitates the movement of those species across their range

- impacts of development on water quality, water bodies and hydrological processes that sustain threatened species and threatened ecological communities

- impacts of wind turbine strikes on protected animals

- impacts of vehicle strikes on threatened species or on animals that are part of a TEC.

As outlined within the preceding sections, the proposed development sought to avoid and minimise potential impacts by carefully locating the development footprint to utilise areas of the site which have historically already been largely cleared/modified and retaining areas of higher biodiversity values (i.e. TECs).

The site does not contain any karsts, caves, crevices, cliffs or any other geological features of significance.

While the site does contain some exposed surface rocks (associated with watercourses and gullies) it is considered that these areas does not provide critical habitat for the threatened species occurring within the subject site. At this stage, these rocky areas are proposed to be retained as a part of the proposal. Should any rocky areas require removal and/or relocation, these potential impacts will be discussed in more detail within the D.A reporting stage. Nevertheless, it is considered that there is extensive rock outcropping surrounding the development site that will not be affected by the proposed development, and the impacts are expected to be negligible.

As discussed within **Section 4.6**, it is considered that the human-made structures and non-native vegetation of the site does not contain habitat for threatened species or ecological communities.

It is noted that the majority of the site's watercourses and waterbodies occurs below 140 AHD which is subject to future inundation area. All areas of the proposed development footprint are external to this inundation area. The majority of the site's mapped watercourses are ephemeral streams, gullies and drainage lines. The majority of these areas are currently infested with exotic species (in particularly Privets, Camphor Laurel, Lantana and exotic grasses) and are subject to future restoration works.

All areas within the subject site where the Giant Barred Frog (*Mixophyes iteratus*) have been recorded during the survey efforts, are below 140 AHD and are within the proposed dam inundation area. Waterbodies which provides suitable foraging habitat for the Southern Myotis (*Myotis macropus*) is proposed to be retained.

There are no wetland or floodplain type TEC occurring within the subject site.

A Stormwater Management Master Plan (prepared by Planit) has been prepared for the proposal which demonstrates preliminary stormwater quality and sediment and erosion control measures proposed to be implemented during the construction and operational phase of the proposal. These measures incorporate *Managing Urban Stormwater – Soils and Construction – Volume 2C Unsealed Roads (DECC 2008), Managing Urban Stormwater – Soils and Construction 4th Edition – Volume 1(Landcom 2004)* and *Erosion and Sediment Control on Unsealed Roads (DECC 2012).*

The proposed works are not anticipated to have any substantial or long-term adverse impacts on the site's watercourses and waterbodies or downstream impacts during heavy rain events. Detailed management plans will be prepared and implemented as a part of the Stewardship Agreement.

With the exception of road crossings and restoration works, it is recommended that a minimum of 30m buffer be provided between the Tweed River and the development footprint. This is considered a sufficient buffer between the waterway and proposed development footprint to protect its values.

The impacts of wind turbines are not applicable to this proposal.

Whilst additional daily vehicle movements will occur on the site and associated roads (i.e. Kyogle Road), the proposed roads within the development site will be low speed given the contours of the site. Wildlife signages are to be installed along roadways throughout the subject site warning drivers of wildlife.

5.2.5 Serious and Irreversible Impacts

Guidance to assist a decision-maker to determine a serious and irreversible impact (OEH, 2017) contains a list of BC Act listed ecological communities and threatened species that are potential for SAII.

The principles used to determine if a development will have serious and irreversible impacts, include impacts that:

- Will cause a further decline of the species or ecological community that is currently observed, estimated, inferred, or reasonably suspected to be in a rapid rate of decline, or
- Will further reduce the population size of the species or ecological community that is currently observed, estimated, inferred, or reasonably suspected to have a very small population size, or
- Impact on the habitat of a species or ecological community that is currently observed, estimated, inferred, or reasonably suspected to have a very limited geographic distribution, or
- Impact on a species or ecological community that is unlikely to respond to measures to improve habitat and vegetation integrity and is therefore irreplaceable.

No threatened ecological communities (listed within Appendix 3 of the *Guidance to assist a decision-maker to determine a serious and irreversible impact*) occurs within the subject site.

The following threatened species have been recorded within the subject site and are candidate SAIIs (listed within Appendix 2 of the *Guidance to assist a decision-maker to determine a serious and irreversible impact*):

Table 26: SAII Candidate Species Recorded Onsite

Species
Smooth Davidson's Plum (*Davidsonia johnsonii*)
Small-leaved Tamarind (*Diploglottis campbellii*)
Green-leaved Rose Walnut (*Endiandra muelleri subsp. bracteata*)
Scrub Turpentine (*Rhodamnia rubescens*)
Durobby (*Syzygium moorei*)
The Large-eared Pied Bat (*Chalinolobus dwyeri*)
Little bentwing-bat (*Miniopterus australis*)
Large bentwing-bat (*Miniopterus orianae subsp. oceanensis*)
Sooty Owl (*Tyto tenebricosa*)
Eastern Cave Bat (*Vespadelus troughtoni*)

Four (4) planted specimens of Smooth Davidson's Plum were recorded proximate to a dwelling within Lot 4/DP737440. These specimens are proposed to be retained as a part of the proposal and will not be impacted upon.

Within the development footprint, several juvenile Durobby (*Syzygium moorei*) were recorded within a yard proximate to a dwelling on Lot 34 DP755714. An additional planted Durobby was recorded proximate to a shed at the Outward Bound Australia centre. A small planted Small-leved Tamarind (*Diplloglottis campbellii*) was also observed amongst other landscape species within the Outward Bound Australia land.

These specimens were obviously planted within this location amongst other ornamental/landscape species and have not been assessed any further.

Little is known about the habitat and roosting requirements of the Large-eared Pied Bat, but natural roosts may depend heavily on sandstone outcrops. It has been found roosting in disused mine shafts, caves, overhangs and disused Fairy Martin (*Hirundo ariel*) nests for shelter and to raise young. Although the species was detected from Anabat surveys conducted over the site, the development footprint lacks key breeding habitat and therefore this species will not be considered any further.

The Little Bentwing-bat was also detected onsite during Anabat survey efforts. Only five nursery sites /maternity colonies are known in Australia which are located within limestone caves. This type of habitat was not recorded on site and will not be impacted upon as a result of the proposal. This species will not be considered any further.

Whilst the Large Bentwing-bat was recorded on numerous occasions during Anabat survey efforts over the subject site, known maternity roost type habitat for the species (limestone and sandstone caves, abandoned gold mines, concrete bunkers and lava tubes) does not occur within the site and will not be impacted upon as a result of the proposal. This species will not be considered any further.

The Sooty Owl was recorded during nocturnal survey efforts of the site. Cave type habitats which the species occasionally utilises for breeding purposes does not occur onsite.

Like the other abovementioned microbats, the Eastern Cave Bat was recorded onsite during Anabat survey efforts. This bat requires caves for breeding purposes. No such habitat types were observed within the subject site therefore, this species will not be considered any further.

The following species (Green-leaved Rose Walnut and Scrub Turpentine) have been assessed against the SAII Guidelines:

Green-leaved Rose Walnut (Endiandra muelleri subsp. bracteata)

a. The action and measures taken to avoid the direct and indirect impact on the potential entity for a SAII.

The impact on Green-leaved Rose Walnut cannot be entirely avoided due to the contours of the site and the Asset Protection Zones required.

Approximately 106.58ha of potential Green-leaved Rose Walnut habitat (PCT 1073 & PCT 812) occurs within the proposed development footprint.

The proposal would result in impacts to ~106.58ha of native vegetation but has avoided more than 757ha of native vegetation that could have yielded additional dwellings within the site.

Existing cleared/modified areas of the subject site have been exploited for the development footprint. This includes utilsing existing roads and tracks for proposed roads and exploiting existing crossings over the Tweed River.

The retained areas of the site will be subject to a future Stewardship Agreement which will protect and enhance these areas.

Proposed management plans will be prepared as a part of a Stewardship Agreement to restore and increase biodiversity values within retained areas of the site. This will include weed control measures which will help remove heavily infested areas, allowing for natural regeneration to occur.

Additional management plans will also be prepared and implemented during the construction and operational phase to ensure potential impacts upon retained areas are avoided. These may include (but not limited to) Vegetation Management Plan, Sediment and Erosion Control Plan, Stormwater Management Plan, Fauna Management Plan, Construction Environmental Management Plan, Bushfire Management Plan and Waste Management Plan.

A number of Green-leaved Rose Walnut were also recorded within rainforest and wet sclerophyll type habitat within Mebbin National Park during the survey period.

b. The size of the local population directly and indirectly impacted by the development, clearing or biodiversity certification.

Fifty-two (52) Green-leaved Rose Walnut were recorded within the overall subject site during survey efforts.

Given its large-scale and difficult terrains, it was not practical to conduct flora surveys in accordance with Guidelines over the overall site (>1500ha). The species is common within the site and surround locality is considered likely that the Green-leaved Rose Walnut population within the overall subject site is considerably higher than what has been recorded.

This species has been regularly recorded throughout the region (pers obs.), in particularly areas of the Gold Coast hinterland (~25km north of the site), and areas within Mebbin National Park.

Twelve (12) Green-leaved Rose-walnut occurs within the proposed developable area.

c. The extent to which the impact exceeds any threshold for the potential entity.

N/A.

d. The likely impact (including direct and indirect impacts) that the development, clearing or biodiversity certification will have on the habitat of the local population, including but not limited to:

  i. an estimate of the change in habitat available to the local population as a result of the proposed development.
  ii. the proposed loss, modification, destruction or isolation of the available habitat used by the local population
  iii. modification of habitat required for the maintenance of processes important to the species' life cycle (such as in the case of a plant – pollination, seed set, seed dispersal, germination), genetic diversity and long-term evolutionary development.

Twelve (12) Green-leaved Rose Walnut were recorded within the proposed developable area.

The proposal would result in impacts to ~106.58ha of native vegetation but has avoided more than 800ha of native vegetation which may provide habitat for this species. These retained sections of the site will be subject to a Stewardship Agreement which will protect and enhance the ecological values of these areas.

Proposed management plans will be prepared as a part of a Stewardship Agreement to restore and increase biodiversity values within retained areas of the site.

The BioNet Atlas contains five-hundred and thirty-five (535) records of this species occurring within the Southeast Queensland (NSW) IBRA region. It is considered that the actual population of this species is considerably higher given the number of individuals recorded during survey efforts within the locality (pers obs.)

e. The likely impact on the ecology of the local population. At a minimum, address the following:

i. for flora, address how the proposal is likely to affect the ecology and biology of any residual plant population that will remain post development including where information is available:

- **pollination cycle**
- **seedbanks**
- **recruitment, and**
- **interactions with other species (e.g. pollinators, host species, mycorrhizal associations).**

The ecology of the local population of Green-leaved Rose Walnut is unlikely to be significantly impacted by the proposal due to the following reasons:

- The species is common within the region and has been regularly recorded within the Study Area, Mebbin National Park and the Gold Coast Hinterland (pers. obs.);
- More than 800ha of retained bush is proposed within the site which will be subject to numerous management plans;
- The site adjoint Mebbin National Park which contains ~3800ha of potential habitat for this species;
- Mitigation measures requiring the implementation of appropriate sediment and erosion controls measures will reduce potential damage to habitat from sedimentation, run-off and or pollution.
- Installation of signages and appropriate fencing (where applicable) will reduce the likelihood of any impacts from increased human interference that may occasionally traverse the bushland.
- Proposed restoration measures within retained areas of the site will remove weeds which will reduce competition and allow for natural regeneration to occur.

f. A description of the extent to which the local population will become fragmented or isolated as a result of the proposed development.

The proposal is unlikely to result in the fragmentation or isolations of populations of the Green-leaved Rose Walnut. Large expansive contiguous areas of vegetation will be retained within the site. These areas will be subject to a Stewardship Agreement which will protect and enhance vegetation within these areas.

The species has been recorded throughout the locality, which includes retained areas of the site, and Mebbin National Park.

Approximately 106.58ha of potential Green-leaved Rose Walnut habitat (PCT 1073 & PCT 812) occurs within the proposed developable footprint.

The species has been regularly recorded throughout the locality which includes Mebbin National Park (pers obs.).

As previously stated, existing cleared/modified areas of the subject site have been exploited for the development footprint. This includes utilsing existing roads and tracks for proposed roads and exploiting existing crossings over the Tweed River and areas of plantation.

g. The relationship of the local population to other population/populations of the species. This must include consideration of the interaction and importance of the local population to other population/populations for factors such as breeding, dispersal and genetic viability/diversity, and whether the local population is at the limit of the species' range.

The proposal footprint ensures that expansive contiguous areas of bushland which may provide habitat for the species is retained within the site.

The proposal footprint utilises existing roads and tracks for proposed roads and exploiting existing crossings over the Tweed River. This has helped reduce fragmentation and barrier effects.

Management measures for the retained areas of the site are proposed. This will include weed management measures which will help eradicate weeds from heavily infested areas and enhance dispersal and regeneration opportunities within the locality.

h. The extent to which the proposed development will lead to an increase in threats and indirect impacts, including impacts from invasive flora and fauna, that may in turn lead to a decrease in the viability of the local population

Proposed management plans will be prepared as a part of a Stewardship Agreement to restore and increase biodiversity values within retained areas of the site. This will include weed control measures which will help remove heavily infested areas, allowing for natural regeneration to occur.

i. An estimate of the area, or number of populations and size of populations that is in the reserve system in NSW, the IBRA region and the IBRA subregion

There are no known population size estimates based on literature review.

Within northern NSW, records of the Green-leaved Rose Walnut are known from:

DEC estate: the Nature Reserves of Billinudgel, Broken Head, Brunswick Heads, Inner Pocket, Limpinwood, Numinbah and Snows Gully, with the National Parks of Border Ranges, Goonengerry, Mebbin, Mooball, Mount Jerusalem, Mount Warning, and Nightcap (DECC, 2004).

According to the NSW Bionet Atlas, there are two-hundred and sixty-six (266) Green-leaved Rose Walnut records within the Scenic Rim IBRA subregion (refer to **Figure 19**).

Additionally, there are five-hundred and thirty-five (535) records of Green-leaved Rose Walnut occurring within the South East Queensland (NSW) IBRA region (refer to **Figure 20**).

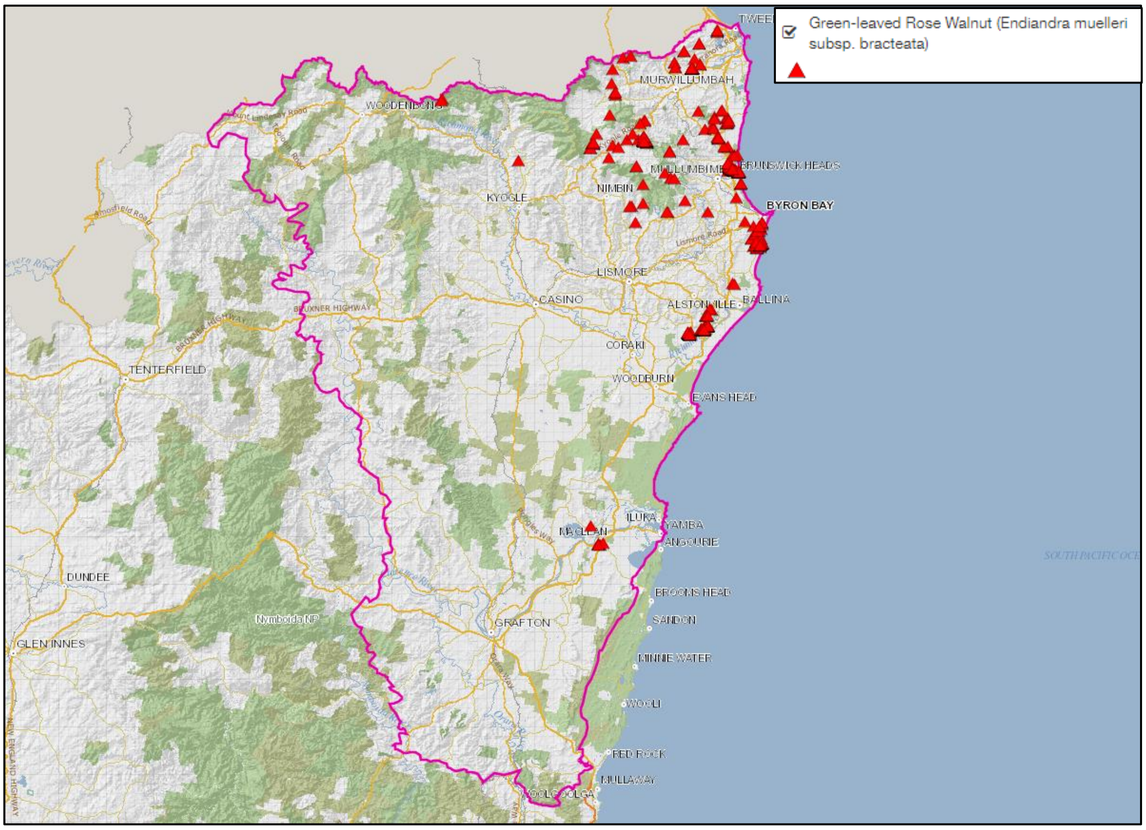

☑ Green-leaved Rose Walnut (Endiandra muelleri subsp. bracteata)
🔺
MURWILLUMBAH
WOODENBONG
KYOGLE
NIMBIN
MULLUMBIMBY
BRUNSWICK HEADS
BYRON BAY
LISMORE
CASINO
ALSTONVILLE
BALLINA
CORAKI
WOODBURN
EVANS HEAD
TENTERFIELD
ILUKA
YAMBA
ANGOURIE
MACLEAN
DUNDEE
Nymboida NP
GRAFTON
GLEN INNES
BROOMS HEAD
SANDON
MINNIE WATER
WOOLI
RED ROCK
MULLAWAY
WOOLGOOLGA
BRUXNER HIGHWAY
SOUTH PACIFIC OCE

Figure 19: Green-leaved Rosed Walnut Bionet Records within IBRA Region (Bionet Atlas, 2020)

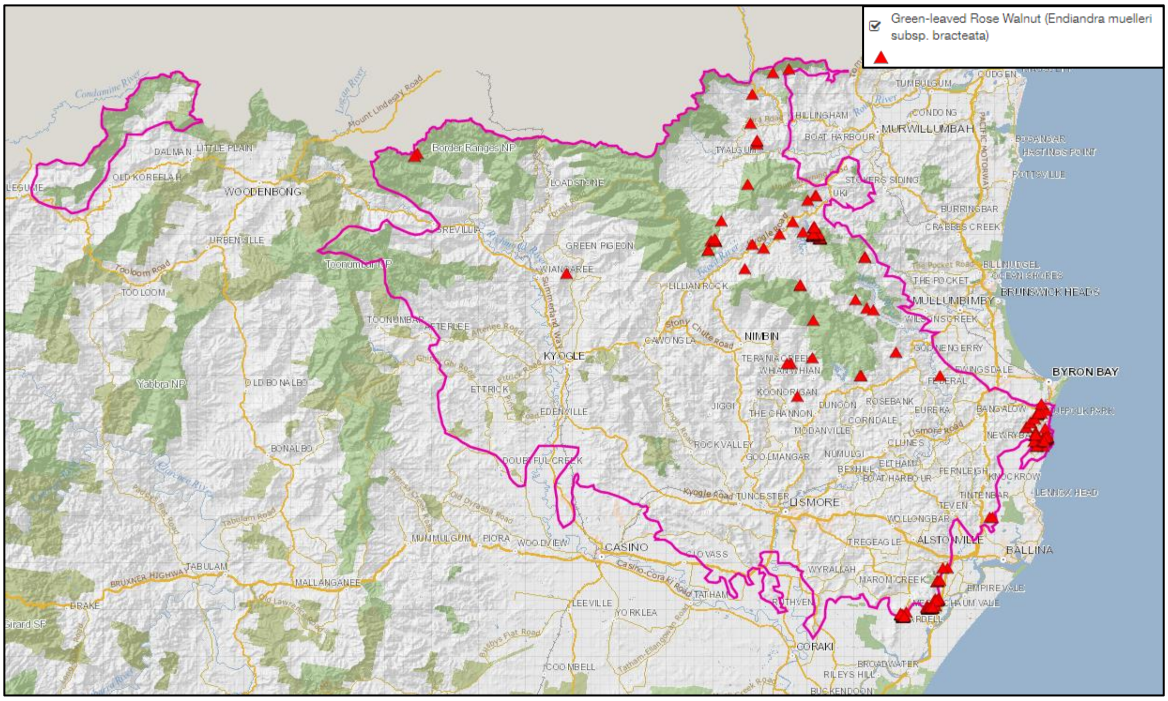

☑ Green-leaved Rose Walnut (Endiandra muelleri subsp. bracteata)
🔺
TUMBULGUM
CONDONG
MURWILLUMBAH
BILLINGHAM
BOAT HARBOUR
DALMAN
LITTLE PLAIN
OLD KOREELAH
WOODENBONG
URBENVILLE
TOOLOOM
Yabbra NP
OLD BONALBO
BONALBO
TABULAM
MALLANGANEE
DRAKE
Border Ranges NP
Toonumbar NP
GREEN PIGEON
WIANGAREE
LILLIAN ROCK
KYOGLE
ETTRICK
EDENVILLE
UKI
STOKERS SIDING
BURRINGBAR
CRABBES CREEK
MULLUMBIMBY
BRUNSWICK HEADS
NIMBIN
BYRON BAY
BANGALOW
LISMORE
CASINO
WOLLONGBAR
ALSTONVILLE
BALLINA
TREGEAGLE
WYRALLAH
CORAKI
BROADWATER
RILEYS HILL

Figure 20: Green-leaved Rose Walnut Bionet Records within IBRA Subregion (Bionet Atlas, 2020)

j. The measure/s proposed to contribute to the recovery of the species in the IBRA subregion.

Contribution to the species recovery in the region will be achieved through securing offset based on the amount of credits required to be retired.

The species credits that would be required to offset the impacts of the proposal on candidate threatened species are presented within **Section 6**. Securing an appropriate offset would contribute to the protection of the Green-leaved Rose-walnut.

Additional measures proposed to contribute to the recovery of this species includes proposed rehabilitation works within areas of the overall subject site which are currently highly degraded and infested with weeds. Where possible, the future rehabilitation works will include revegetation works, which will include this species.

Scrub Turpentine (Rhodemnia rubescens)

a. The action and measures taken to avoid the direct and indirect impact on the potential entity for a SAII.

The impact on Scrub Turpentine cannot be entirely avoided.

Approximately 106.58ha of potential Scrub Turpentine habitat (PCT 1073 & PCT 812) occurs within the proposed developable footprint.

The proposal would result in impacts to ~106.58ha of native vegetation but has avoided more than 800ha of native vegetation that could have yielded additional dwellings within the site

Existing cleared/modified areas of the subject site have been exploited for the development footprint. This includes utilsing existing roads and tracks for proposed roads and exploiting existing crossings over the Tweed River.

The retained areas of the site will be subject to a future Stewardship Agreement which will protect and enhance these areas.

Proposed management plans will be prepared as a part of a Stewardship Agreement to restore and increase biodiversity values within retained areas of the site. This will include weed control measures which will help remove heavily infested areas, allowing for natural regeneration to occur.

Additional management plans will also be prepared and implemented during the construction and operational phase to ensure potential impacts upon retained areas are avoided. These may include (but not limited to) Vegetation Management Plan, Sediment and Erosion Control Plan, Stormwater Management Plan, Fauna Management Plan, Construction Environmental Management Plan, Bushfire Management Plan and Waste Management Plan.

b. The size of the local population directly and indirectly impacted by the development, clearing or biodiversity certification.

The Scrub Turpentine is relatively common within the site and locality. 118 Scrub Turpentine were recorded within the proposed developable area. The majority of these were juvenile or semi-mature specimens (<5m in height). Larger specimens (>8m in height) were relatively uncommon within the site.

Given its large-scale and difficult terrains, it was not practical to conduct flora surveys in accordance with Guidelines over the overall site (>1500ha). The species is common within the site and surround locality is considered likely that the Scrub Turpentine population within the overall subject site is considerably higher than what has been recorded.

The species has been regularly recorded throughout the region (pers obs.), which includes retained areas of the site, and Mebbin National Park.

c. The extent to which the impact exceeds any threshold for the potential entity.

N/A.

d. The likely impact (including direct and indirect impacts) that the development, clearing or biodiversity certification will have on the habitat of the local population, including but not limited to:

  iv. an estimate of the change in habitat available to the local population as a result of the proposed development.
  v. the proposed loss, modification, destruction or isolation of the available habitat used by the local population
  vi. modification of habitat required for the maintenance of processes important to the species' life cycle (such as in the case of a plant – pollination, seed set, seed dispersal, germination), genetic diversity and long-term evolutionary development.

~106.58ha of recorded Scrub Turpentine habitat were recorded within the proposed developable area.

The proposal would result in impacts to ~106.58ha of native vegetation but has avoided more than 800ha of native vegetation which may provide habitat for this species. These retained sections of the site will be subject to a Stewardship Agreement which will protect and enhance the ecological values of these areas.

The BioNet Atlas contains five-hundred and thirty-five (535) records of this species occurring within the Southeast Queensland (NSW) IBRA region. It is considered that the actual population of this species is considerably higher given the number of individuals recorded during survey efforts within the locality (pers obs.).

Proposed management plans will be prepared as a part of a Stewardship Agreement to restore and increase biodiversity values within retained areas of the site.

e. The likely impact on the ecology of the local population. At a minimum, address the following:

  ii. for flora, address how the proposal is likely to affect the ecology and biology of any residual plant population that will remain post development including where information is available:
  - **pollination cycle**
  - **seedbanks**
  - **recruitment, and**
  - **interactions with other species (e.g. pollinators, host species, mycorrhizal associations).**

The ecology of the local population of Scrub Turpentine is unlikely to be significantly impacted by the proposal due to the following reasons:

- The species is common within the region and has been regularly recorded within the Study Area, Mebbin National Park and the Tweed Shire (pers. obs.);

- More than 800ha of retained bush is proposed within the site which will be subject to numerous management plans;
- The site adjoint Mebbin National Park which contains ~3800ha of potential habitat for this species;
- Mitigation measures requiring the implementation of appropriate sediment and erosion controls measures will reduce potential damage to habitat from sedimentation, run-off and or pollution.
- Installation of signages and appropriate fencing (where applicable) will reduce the likelihood of any impacts from increased human interference that may occasionally traverse the bushland.

Proposed restoration measures within retained areas of the site will remove weeds which will reduce competition and allow for natural regeneration to occur.

f. A description of the extent to which the local population will become fragmented or isolated as a result of the proposed development.

The proposal is unlikely to result in the fragmentation or isolations of populations of the Scrub Turpentine. Large expansive contiguous areas of vegetation will be retained within the site. These areas will be subject to a Stewardship Agreement which will protect and enhance vegetation within these areas.

The species has been recorded throughout the locality, which includes retained areas of the site, and Mebbin National Park.

Approximately 106.58ha of potential Scrub Turpentine habitat (PCT 1073 & PCT 812) occurs within the proposed developable footprint.

The species has been regularly recorded throughout the locality which includes Mebbin National Park (pers obs.).

As previously stated, existing cleared/modified areas of the subject site have been exploited for the development footprint. This includes utilsing existing roads and tracks for proposed roads and exploiting existing crossings over the Tweed River and areas of plantation.

g. The relationship of the local population to other population/populations of the species. This must include consideration of the interaction and importance of the local population to other population/populations for factors such as breeding, dispersal and genetic viability/diversity, and whether the local population is at the limit of the species' range.

The proposal footprint ensures that expansive contiguous areas of bushland which may provide habitat for the species is retained within the site.

The proposal footprint utilises existing roads and tracks for proposed roads and exploiting existing crossings over the Tweed River. This has helped reduce fragmentation and barrier effects.

Management measures for the retained areas of the site are proposed. This will include weed management measures which will help eradicate weeds from heavily infested areas and enhance dispersal and regeneration opportunities within the locality.

h. The extent to which the proposed development will lead to an increase in threats and indirect impacts, including impacts from invasive flora and fauna, that may in turn lead to a decrease in the viability of the local population

Proposed management plans will be prepared as a part of a Stewardship Agreement to restore and increase biodiversity values within retained areas of the site. This will include weed control measures which will help remove heavily infested areas, allowing for natural regeneration to occur.

A Myrtle Rust Management Plan should be implemented for the construction phase of the development.

i. An estimate of the area, or number of populations and size of populations that is in the reserve system in NSW, the IBRA region and the IBRA subregion

There are no known population size estimates based on literature review.

According to the NSW Bionet Atlas, there are three-hundred and seven (307) Scrub Turpentine records within the Scenic Rim IBRA subregion (refer to **Figure 21**).

Additionally, there are five-hundred and sixty-hour (564) records of Scrub Turpentine occurring within the South East Queensland (NSW) IBRA region (refer to **Figure 22**).

The number of mature individuals of Rhodamnia rubescens in NSW is currently unknown. No formal estimates of total abundance of R. rubescens across the range of the species prior to 2010 has been located (Australian Network for Plant conservation Inc. (ANPC) in litt. April 2016). However, it is reasonably suspected that given the large geographic range size of R. rubescens and its characterisation as a 'common' species (Floyd 1989; Benson and McDougall 1998) that a large number of mature individuals may have existed in NSW prior to 2010.

It is noted that nearly 20,000ha of Reserves (Mebbin National Park, Wollumbin National Park, Nightcap National Park, Mount Jerusalem National Park) occurs within the locality of the site. These Reserves contain Scrub Turpentine records (Bionet Atlas) with habitat for the species.

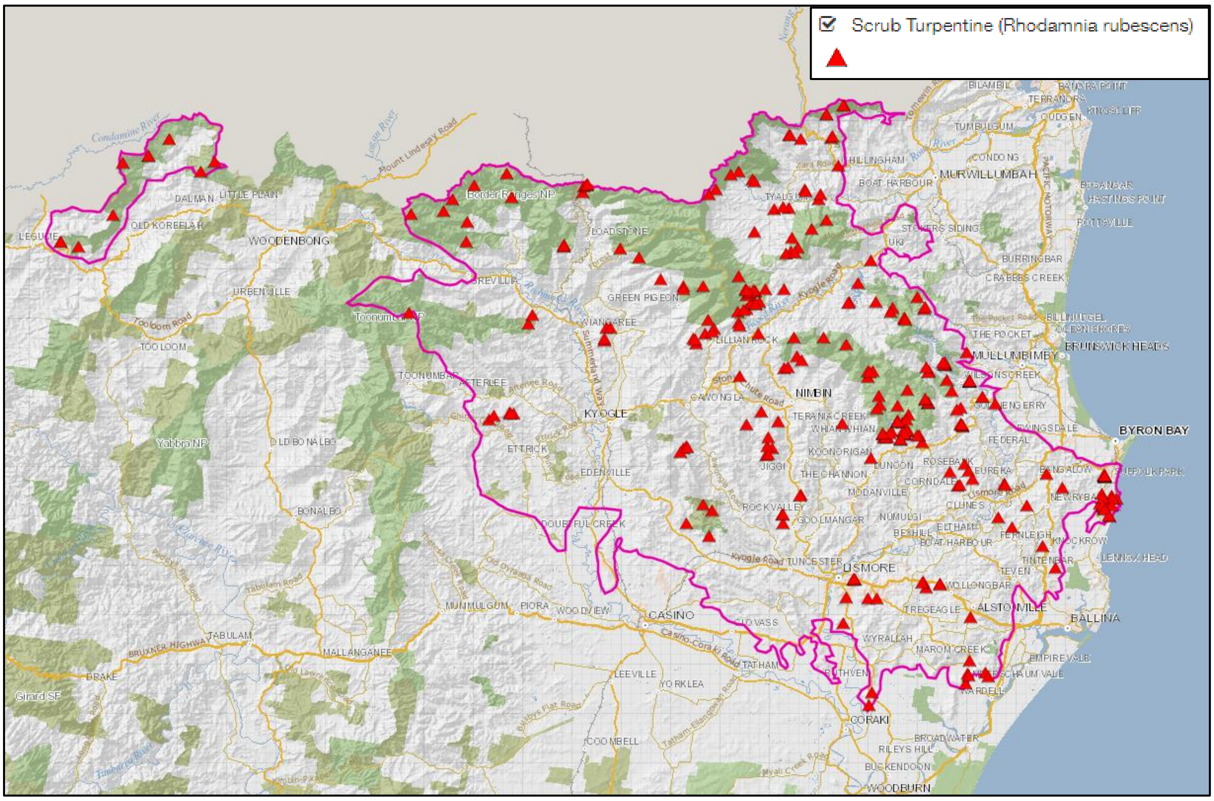

☑ Scrub Turpentine (Rhodamnia rubescens)
▲
Border Ranges NP
MURWILLUMBAH
TUMBULGUM
KINGSCLIFF
MULLUMBIMBY
BRUNSWICK HEADS
BYRON BAY
NIMBIN
KYOGLE
LISMORE
CASINO
BALLINA
ALSTONVILLE
CORAKI
WOODENBONG
LEGUME
DALMAN
LITTLE PLAIN
OLD KOREELAH
URBENVILLE
TOOLOOM
Yabbra NP
OLD BONALBO
BONALBO
TABULAM
MALLANGANEE
DRAKE
Girard SF
GREVILLIA
GREEN PIGEON
WIANGAREE
LILLIAN ROCK
ETTRICK
EDENVILLE
DOUBTFUL CREEK
MUMMULGUM
PIORA
WOODVIEW
LEEVILLE
YORKLEA
COOMBELL
THE CHANNON
ROCK VALLEY
GOOLMANGAR
CLUNES
BEXHILL
EUREKA
NEWRYBAR
LENNOX HEAD
WOLLONGBAR
TREGEAGLE
WYRALLAH
MAROM CREEK
WARDELL
BROADWATER
RILEYS HILL
BUNGAWALBIN
WOODBURN
FEDERAL
BANGALOW
BILLINUDGEL
THE POCKET
BURRINGBAR
CRABBES CREEK
STOKERS SIDING
UKI
BILLINGHAM
CONDONG
TERRANORA
BILAMBIL
BANORA POINT
TWEED HEADS

Figure 21: Scrub Turpentine Bionet Records within IBRA Subregion (Bionet Atlas, 2020)

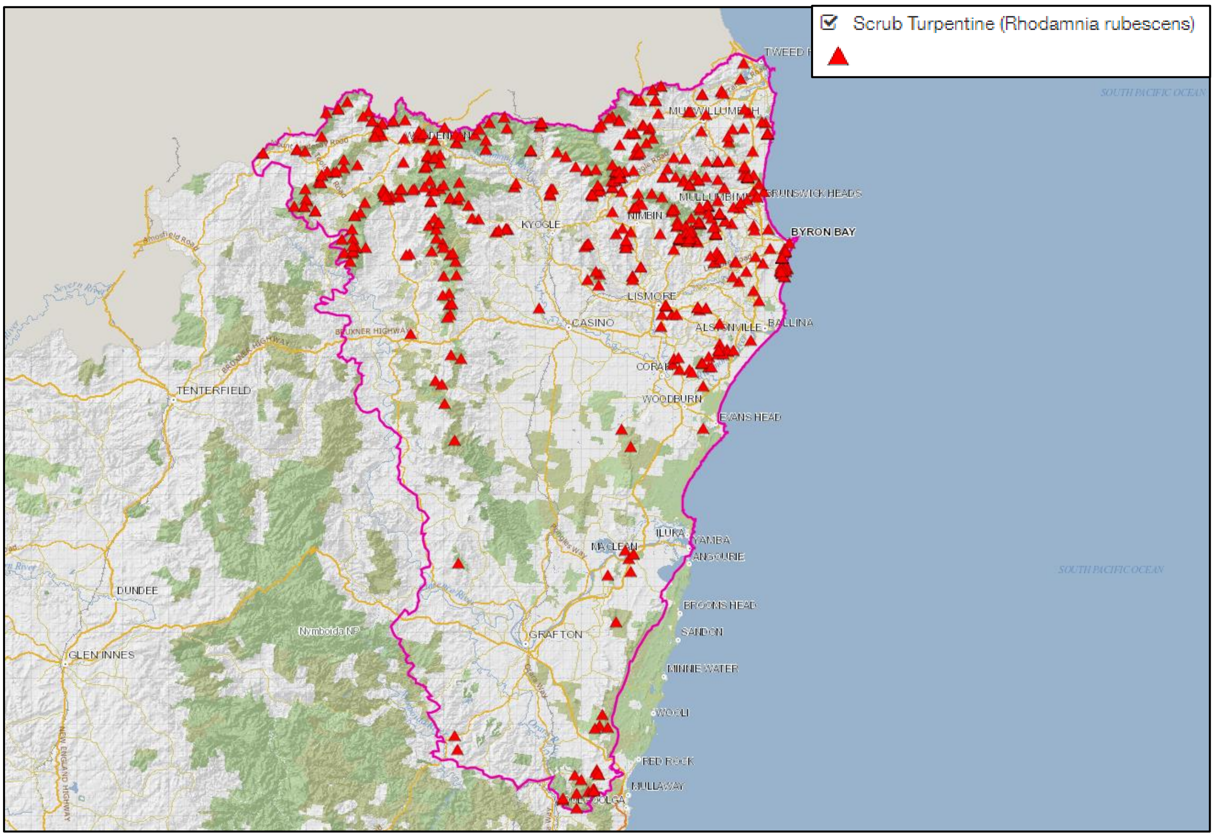

☑ Scrub Turpentine (Rhodamnia rubescens)
▲
MURWILLUMBAH
BRUNSWICK HEADS
BYRON BAY
MULLUMBIMBY
NIMBIN
KYOGLE
LISMORE
CASINO
ALSTONVILLE
BALLINA
CORAKI
WOODBURN
EVANS HEAD
TENTERFIELD
BRUXNER HIGHWAY
DUNDEE
GLEN INNES
Nymboida NP
GRAFTON
ILUKA
YAMBA
ANGOURIE
MACLEAN
BROOMS HEAD
SANDON
MINNIE WATER
WOOLI
RED ROCK
MULLAWAY
SOUTH PACIFIC OCEAN
SOUTH PACIFIC OCEAN
NEW ENGLAND HIGHWAY

Figure 22: Scrub Turpentine Bionet Records within IBRA Region (Bionet Atlas, 2020)

j. The measure/s proposed to contribute to the recovery of the species in the IBRA subregion.

The proposal would contribute to the recovery of Scrub Turpentine in the IBRA subregion through retirement of species credits in accordance with the BAM, which will protect and enhance habitat for this species.

Additional measures proposed to contribute to the recovery of this species includes proposed rehabilitation works within areas of the overall subject site which are currently highly degraded and infested with weeds. Where possible, the future rehabilitation works will include revegetation works, which will include this species.

5.2.6 Adaptive Management of Uncertain Impacts

Uncertain impacts are those that are unable to be reliably predicted during the assessment process or are infrequent in nature. The proposed development is unlikely to result in any uncertain impacts that require adaptive management as stated within Section 9.4.2 of the BAM.

The Preliminary Rehabilitation Plan (refer to **Appendix 6**) details a proposed strategy for monitoring, reporting, performance criteria and corrective actions. A more detailed restoration plan is proposed within the later stages of the development. Additional management and monitoring regimes will be implemented within the Construction Environmental Management Plan (CEMP) and the future BSSAR.

5.3 Mitigating and Managing Impacts on Biodiversity Values

The following measures is to be undertaken to mitigate impacts to native vegetation and habitat during the construction and operational phases of the development:

Table 27: Minimisation of Potential Indirect Impacts

Aspect	Project Phase	Potential Impact and causes	Mitigation Measures	Timing	Responsibility	Risk Before Mitigation	Risk After Mitigation
Weeds and Pathogens	Construction	Introduction of weeds to the site and adjacent retained vegetation	Prepare a weed management protocol within the CEMP to ensure weeds are not transported or spread into retained areas. Vehicle and machinery washing before entering and exiting the subject site. Any weeds that are removed during the construction phase should be disposed of via an appropriate waste facility.	Duration of construction works	Project Manager Contractor	Low	Very Low
	Operational		Enforcement of legal obligations to control priority weeds within subdivision areas to prevent the spread of propagules into adjacent areas of native vegetation.	During operations	Dwelling owner	Low	Very Low
Rubbish dumping	Construction	Rubbish and waste retained onsite or dumped within retained areas	The contractor undertaking the works would detail waste management procedures in a Waste Management Plan to be incorporated into the CEMP.	Duration of construction works	Project Manager Contractor	Low	Very Low
	Operational	Rubbish and waste dumped within retained areas.	Rubbish dumping (including garden waste) within retained vegetation areas is prohibited. All rubbish is to be appropriately disposed.	During operations	Dwelling owner	Low	Very Low
Increase in predatory species populations	Construction	Predation by domestic animals	Domestic animals would not be permitted within the site during the construction phase of the development. This is to be documented within the CEMP prepared for the proposal.	Duration of construction works	Project Manager Contractor	Low	Very Low
	Operational	Predation by domestic animals	Dogs and cats would not be permitted to free roam within the proposed open space areas which are to be an on-leash area only to minimize harassment of residual fauna.	During operations	All personnel	Low	Very Low
Increased risk of fire	Construction	Changes to existing fire regimes and / or increased frequency of fire	Prohibition of lighting of fires external to the dwelling envelopes.	All times	All personnel	Low	Very Low
	Operational						

Aspect	Project Phase	Potential Impact and causes	Mitigation Measures	Timing	Responsibility	Risk Before Mitigation	Risk After Mitigation
Sedimentation run-off	Construction	During construction, the disturbance of soils would create the potential for the mobilisation of sediment. The potential for accidental spill and leaks is a further issue.	Activities on the site will be managed in accordance with the approved CEMP which will incorporate mitigation measures such as: Appropriate sediment and erosion control measures will be incorporated during the clearing and construction phase of the proposal, ensuring no downstream impacts will arise, in particularly during rainfall events. There is to be no release of dirty water into drainage lines and/or waterways Water quality control measures are to be used to prevent any materials (eg. concrete, grout, sediment etc) entering drain inlets or waterways. Stabilised construction access would be provided to all work areas. Works would be stopped if conditions are not suitable, such as during heavy rain or high winds. Construction works would be managed such that areas outside the scope of works would remain undisturbed. Potable water is to be used for wash down. Erosion and sediment controls would be inspected regularly by the site supervisor throughout construction and within 24 hours of a major rainfall event to ensure they are maintained in proper working order throughout the time they are in place. The condition of sediment control structures would be monitored and maintained in proper working order throughout the time they are in place. They would be kept clear of debris at all times and cleared of sediment if filled >50%. Procedures and measures for reporting, management and cleanup of spills of any fuels, chemicals or other potentially contaminating items are to be incorporated into the construction environmental management plan. If stored on site, chemicals and fuels would be stored within bunded areas. Spill kits are to be kept on-site. All spills are to be reported to the Site Manager and Environmental Officer.	Duration of construction works	Project Manager Contractor Project Engineer	Medium	Very Low
Vehicle strikes	Construction	Vehicle strikes on native fauna	Signposting and enforcement of appropriate speed limits. Vehicle movement to occur during daylight hours only.	Duration of construction works	Contractor	Low	Very Low

Aspect	Project Phase	Potential Impact and causes	Mitigation Measures	Timing	Responsibility	Risk Before Mitigation	Risk After Mitigation
	Operational	Vehicle strikes on native fauna	Signposting and enforcement of appropriate speed limits along internal roads to reduce the likelihood of vehicle strike and mortality of native fauna.	During operations	All personnel	Low	Very Low
Noise & Vibration	Construction	The proposed activity has the potential to cause an increase in noise levels at the site during the construction phase. Increases in noise would be attributed to construction plant and machinery.	Activities on the site will be managed in accordance with the approved CEMP which will incorporate mitigation measures such as: Works are to be carried out during normal work hours (i.e. 7am to 6pm Monday to Friday; 8am to 1pm Saturdays). No works would likely be undertaken on Sundays or public holidays. The idling of machinery and equipment when not in use and for prolonged periods of time should be avoided at all times. Use of noisy plant simultaneously and/or close together, adjacent to sensitive receivers would be avoided where possible. Plant operators would be instructed to operate equipment in a manner that does not generate unnecessary noise such as avoiding excessive revving or avoiding dragging objects or dropping objects from a height Reversing of vehicles would be minimised where possible to alleviate the annoyance of beeping reverse alarms (or less tonal 'broadband' or 'quacker' type alarms would be utilised Complaint based monitoring would be performed throughout construction as required to confirm the effectiveness of noise management controls A noise complaint register would be developed if required and maintained throughout construction. The register would record all complaints including: Complainant contact details, Source/type of noise causing disturbance, time and duration of noise causing disturbance, times when the noise disruption would cause least disruption, measures taken to address the complaint. All machines will be in good working condition, with particular attention to exhaust silencers, engine covers and other noise reduction devices.	Duration of construction works	Project Manager Contractor	Low	Very Low
	Operational	Potential disruption of threatened species or reduced viability of adjacent habitat	Minimise unreasonable noise and vibration impacts on the surrounding environment.	During operations	All personnel	Low	Very Low

Aspect	Project Phase	Potential Impact and causes	Mitigation Measures	Timing	Responsibility	Risk Before Mitigation	Risk After Mitigation
Dust	Construction	The proposed activity has the potential to cause minor reductions in localised air quality through emissions from vehicles, machinery and equipment. Additionally, dust would also likely be generated during earthworks for the proposal. The amount of dust generated would depend on a number of factors including the silt and moisture content in the soil and the types of activities being undertaken. It is expected that the major sources of dust during construction of the proposal would occur during excavations and earthworks.	Measures (including watering or covering exposed areas) are to be used to minimise or prevent air pollution and dust. Works (including the spraying of paint and other materials) are not to be carried out during strong winds or in weather conditions where high levels of dust or air borne particulates are likely. Vegetation or other materials are not to be burnt on site. Vehicles transporting waste or other materials that may produce odours or dust are to be covered during transportation. Stockpiles or areas that may generate dust are to be managed to suppress dust emissions. All stationary vehicles and equipment not in use will be switched off. Areas of disturbance would be managed at any one time. All disturbed surfaces would be reinstated and stabilised as soon as possible after completion. A Construction Environmental Management Plan (CEMP) is to be prepared for the proposal which will include abovementioned mitigation measures.	Duration of construction works	Project Manager Contractor	Medium	Very Low
Light Spill	Construction	Potential disruption of threatened species	Lights should be turned off when they are not required. No street lighting is proposed as a part of proposal.	All times	All personnel	Low	Very Low
	Operational					Low	Very Low
Damage to Retained Native Vegetation	Construction	Removal of retained native vegetation and loss of habitat	All works with regards to vegetation clearing and working within proximity to vegetation to be retained is to be undertaken in accordance with a Vegetation Management Plan (VMP) to be prepared as a part of the CEMP prior to the commencement of works. Vegetation to be retained onsite must be tagged/marked/delineated prior to commencement of tree clearing for easy identification (do not use permanent paints or similar) i.e. trees and copses of less mature vegetation/small trees will be retained within designated areas are to be clearly fenced in general accordance with the *Australian Standard 4970-2009 Protection of Trees on Development Sites* and similar. The following activities are not permitted within the drip zones of trees to be retained (i.e. trees not designated for removal): • Storage and mixing of materials; • Vehicle parking or manoeuvring; • Liquids disposal; • Machinery repairs or refuelling; • Site office and/or shed erection;	Prior to construction commencing and during construction works	Site Manager Contractor Project Arborist/Ecologist	Medium	Very Low

Aspect	Project Phase	Potential Impact and causes	Mitigation Measures	Timing	Responsibility	Risk Before Mitigation	Risk After Mitigation
			- Lighting of fires; - Rubble, soil or debris stockpiling; and - Excavation. Tree clearing is to be staged allowing potentially occurring fauna species to relocate from the works footprint into retained areas of the site.				
	Operational		No trees within the site proposed for retention are to be removed without the consent from Council.	During operations	All personnel	Low	Very Low
Native Fauna Mortality/Injury	Construction	Fauna mortality/injury during vegetation removal and construction works	Within the designated development/construction zone identification of areas to be cleared are to be pre-assessed by an experienced ecologist/wildlife spotter/catcher. This pre-assessment shall allow for an inventory of fauna habitat components (i.e. bird nests, loose rocks providing reptile refuge, ground logs etc.) to be undertaken prior to felling and construction works. A wildlife spotter catcher would be utilised during all phases of clearing of the site to ensure safe dispersal and relocation of native fauna into neighbouring retained vegetation within the locality. Any diseased, injured or juvenile fauna located that is incapable of dispersal or release will be taken to an experienced wildlife vet, Wildcare (i.e. RSPCA) or Currumbin Wildlife Sanctuary for treatment or fostering prior to release. Clearing of trees is carried out in a way that ensures, while the clearing is being carried out, appropriate habitat links are maintained within the clearing site and between the site and its adjacent areas, to allow fauna living on the site to move out of the clearing area. A wildlife spotter catcher is to be utilised if any native fauna is trapped within the construction site. Installation of nest boxes prior to the removal of hollow-bearing trees.	Prior and during vegetation clearing	Project Ecologist/Spotter Catcher	Medium	Very Low
	Operational	Injury to fauna during operational phase	Injured or orphaned fauna recorded should referred to an appropriate wildlife carer group (i.e. RSPCA) or veterinarian.	During operations	All personnel	Low	Very Low

5.3.1 Risk Assessment

A risk assessment has been undertaken for any residual impacts likely to remain after the mitigation measures have been applied (refer to **Table 27** above)

The risk before and after mitigation measures have been implemented have also been displayed within the last two columns of **Table 27** above.

The likelihood criteria, consequence criteria and the risk matrix are provided within **Table 28** and **Table 29** below.

Table 28: Risk Matrix

Consequence Severity	Likelihood				
	Almost Certain	Likely	Moderate	Unlikely	Remote
Critical	Very High	Very High	High	High	Medium
Major	Very High	High	High	Medium	Medium
Moderate	High	Medium	Medium	Medium	Low
Minor	Medium	Medium	Low	Low	Very Low
Negligible	Medium	Low	Low	Very Low	Very Low

Table 29: Risk Matrix Criteria

Consequence Criteria	Description
Critical	Very serious, long-term and widespread environmental impact. Destruction of sensitive environmental features. Severe impact on ecosystem. Impacts are irreversible.
Major	Serious long-term moderate to widespread environmental impact.
Moderate	Moderate short-term impact at a localized-moderate scale. May be difficult to rehabilitate and may have negative implementations on the ecosystem.
Minor	Minor short-term impact at a localised scale. Impact on fauna, flora and/or habitat but no negative effects on ecosystem. Can be relatively easily rehabilitated.
Negligible	Negligible impact on fauna/flora, habitat, aquatic ecosystem or water resources. Impacts are local, temporary and reversible.
Likelihood Criteria	Description
Almost Certain	Event is expected to occur in most occasions (frequency - weekly)
Likely	Event is expected to occur on many occasions (frequency - monthly)
Moderate	Event is expected to occur on some occasions (frequency - yearly)
Unlikely	Event is expected to occur infrequently (frequency - 10 years)
Remote	Event is not expected to occur, but may occur under exceptional circumstances (frequency - 100 years)

6 Offset Requirements

The BAM Calculator is the tool for quantifying the offset requirements for a project, the output being expressed as ecosystem credits and species credits. The results of the BAM credit calculations completed for the proposed development are provided below. These figures are a 'worst case scenario' in terms of direct impacts on habitat. Within the proposed developable areas, where clearing is not required to facilitate the construction of dwellings, infrastructure and/or APZs,

As the development is proposed to be staged over a number of years, the retirement of credits will also occur in stages. The mandatory retirement of credits will occur based on the impacts required to facilitate the construction of each stage. Ecosystem Credits and Species Credit Species have been divided into stages. These areas were then compiled within the BAM calculator, producing credits required to be retired per stage of the development.

6.1.1 Impacts that do Not Require Further Assessment

The BAM states that "*areas that are not native vegetation do not require further assessment in the BAM except where:*

> *a. They are proposed for restoration as part of an offset*
> *b. They are assessed as habitats for threatened species*".

The following areas within the development footprint do not require offsetting as this area does not provide habitat for threatened species.

- Plantation (~102.9ha); and
- Cleared Areas/Grassed Paddocks with Scattered Trees, Regrowth & Weed Thickets (~117.4ha)

As previously acknowledged, areas of the site containing plantation have been treated as 'cleared/modified areas'. Forestry permits allows the owners to log these areas for timber. These areas will be logged/removed in accordance with existing forestry permits prior to the establishment of dwellings occurring within that area.

It is further noted that Tweed Council have treated areas of native plantation as a 'highly-modified community' within the *Flora and Fauna Survey and Preliminary Impact Assessment for the Proposed Raising of Clarrie Hall Dam, Tweed Shire, NSW* (TSC, 2017) and does not designate the community a Plant Community Type.

6.1.2 Impacts Which Require an Offset

Impacts on Native Vegetation (Ecosystem Credits)

Impacts associated with PCT 1073 / Zone 1 - Moderate / Good Condition Pink Bloodwood – Tallowwood moist open forest of the far northern ranges of the NSW North Coast Bioregion, PCT 812 / Zone 1 - Moderate / Good Condition Dunn's White Gum tall open forest of the ranges of the northern NSW North Coast Bioregion and PCT 812 / Zone 2 - Low Condition Dunn's White Gum tall open forest of the ranges of the northern NSW North Coast Bioregion will require offset under the BAM (refer to **Table 31**).

Table 30: Impacts to Native Vegetation That Require Offsets

Vegetation Zone	Area Impacted (ha)	Vegetation Integrity Score	Ecosystem Credits Required
PCT 1073 / Zone 1 - Moderate / Good Condition Pink Bloodwood – Tallowwood moist open forest of the far northern ranges of the NSW North Coast Bioregion	91	80.9	2763
PCT 812 / Zone 1 - Moderate / Good Condition Dunn's White Gum tall open forest of the ranges of the northern NSW North Coast Bioregion	11.8	72.8	404
PCT 812 / Zone 2 - Low Condition Dunn's White Gum tall open forest of the ranges of the northern NSW North Coast Bioregion	3.8	58.6	

* Ecosystem credits are reflective of the concept plan and is not likely to be reflective of the actual clearing area at the construction stage of the proposal. The clearing areas are likely to be significantly reduced.

Impacts on Threatened Species (Species Credits)

The following species credit species were identified as occurring within the proposed developable areas during targeted survey efforts and require offsetting:

Table 31: Species Credit Species Impacted by the Proposal

Flora*	Credits Required
Green-leaved Rose Walnut (*Endiandra muelleri subsp. bracteata*)	36
Scrub Turpentine (*Rhodamnia rubescens*)	354
Rainforest Senna (*Senna acclinis*)	40
Fauna	**Credits Required****
Southern Myotis (*Myotis macropus*)	1023
Squirrel Glider (*Petaurus norfolcensis*)	4223
Koala (*Phascolarctos cinereus*)	4223

*As the proposal is at a conceptual stage, it is extremely difficult to determine the species credits required for each of the abovementioned flora credit species at this stage given the broad area of the site and the lack of detailed plans. Impacts and credit requirements for the abovementioned flora species will be refined and calculated at the D.A stage of the proposal. Avoiding or relocating (where possible) species will also be considered.

Preliminary fauna species credits are reflective of the concept plan and is not likely to be reflective of the final clearing area at the construction stage of the proposal. Credits illustrated above are the species credits required for the overall proposal. As previously discussed, the proposed development will be staged. Credits requiring to be offset will be retired as required per stage of the development. The staged credits are provided within **Appendix 9.

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Appendix 1 - Flora Data

Species	Common Name	Exotic	High Threat Exotic	Growth Form Group	T1		T2		T3		T4		T5		T6		T7		T8		T9		T10		T11		T12		T13		T14		T15		T16		T17	
					C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A
Acacia falcata	Sickle Wattle	-	-	Shrub (SG)																																		
Acacia binervata	Two-veined Hickory	-	-	Tree (TG)																																		
Acacia irrorata	Green Wattle	-	-	Shrub (SG)																																		
Acacia maidenii	Maiden's Wattle	-	-	Tree (TG)																																		
Acacia melanoxylon	Blackwood	-	-	Tree (TG)	**0.5**	**3**					**5**		**0.5**	**2**					**1**	**2**	**2**	**1**	**2**	**3**	**1**	**1**	**2**	**5**			**0.5**	**1**	**7**		**2**	**8**	**0.5**	**2**
Acacia spp.	Wattle	-	-	Shrub (SG)			**0.1**	**1**	**0.1**	**2**																												
Acmena smithii	Lilly Pilly	-	-	Tree (TG)																																		
Acronychia laevis	Hard Aspen	-	-	Tree (TG)																																		
Acronychia oblongifolia	White Aspen	-	-	Shrub (SG)																																		
Acronychia pubescens	Hairy Pubescens	-	-	Shrub (SG)											**1**	**0.1**																						
Acronychia suberosa	Corky Acronychia	-	-	Tree (TG)													**0.1**	**1**																				
Acronychia spp.	-	-	-	Shrub (SG)			**1**	**2**																														
Adiantum aethiopicum	Common Maidenhair	-	-	Fern (EG)			**0.1**	**1**	**0.5**	**5**																												
Adiantum hispidulum	Rough Maidenhair	-	-	Fern (EG)									**0.1**	**1**	**0.1**	**10**																						
Adiantum silvaticum	-	-	-	Fern (EG)																																		
Ageratina adenophora	Crofton Weed	Yes	Yes	-															**0.2**	**4**	**2**	**50**	**3**	**40**	**0.1**	**5**	**0.5**	**20**	**6**		**1**	**50**						
Ageratina riparia	Mistflower	Yes	Yes	-															**0.1**	**1**																	**0.2**	**1**
Ageratum houstonianum	Blue Billygoat Weed	Yes	-	-																																		
Akania bidwillii	Turnipwood	-	-	Tree (TG)																																		
Alchornea ilicifolia	Native Holly	-	-	Shrub (SG)																																		
Alectryon subcinereus	Wild Quince	-	-	Shrub (SG)																																		
Allocasuarina torulosa	Forest She-oak	-	-	Tree (TG)	**2**	**3**	**10**		**30**				**5**		**0.5**	**1**	**8**	**20**							**0.1**	**1**											**2**	**6**
Alocasia brisbanensis	Cunjevoi	-	-	Forb (F)																																		
Alphitonia petriei	White Ash	-	-	Tree (TG)																																		
Alphitonia excelsa	Red Ash	-	-	Tree (TG)			**0.5**	**2**	**0.2**	**2**																							**1**	**4**			**0.5**	**1**
Alpinia caerulea	Native Ginger	-	-	Forb (F)							**2**	**7**	**3**	**20**	**0.5**	**3**	**0.1**	**1**																				
Alyxia ruscifolia	Prickly Alyxia	-	-	Shrub (SG)																																		

Species	Common Name	Exotic	High Threat Exotic	Growth Form Group	T1		T2		T3		T4		T5		T6		T7		T8		T9		T10		T11		T12		T13		T14		T15		T16		T17	
					C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A
Andropogon virginicus	Whiskey Grass	Yes	Yes	-																																		
Aneilema acuminatum	-	-	-	Forb (F)											0.1	10																						
Araucaria cunninghamii	Hoop Pine	-	-	Tree (TG)	0.1	1					0.1	1																										
Araucaria bidwilli	Bunya Pine	-	-	Tree (TG)																																		
Archidendron grandiflorum	Pink Lace Flower	-	-	Tree (TG)																																		
Archidendron mullerianum	Veiny Lace Flower	-	-	Tree (TG)																																		
Archontophoenix cunninghamiana	Bangalow Palm	-	-	Other (OG)											70	50																						
Archirhodomyrtus beckleri	Rose Myrtle	-	-	Shrub (SG)	2	3	20		0.1	1			0.2	3	0.2	5	1	1					0.2	5							0.5	3	0.5	2	1	4	2	20
Arthropteris tenella	Climbing Fern	-	-	Fern (EG)																																		
Asparagus spp.	-	Yes	Yes	-																																		
Asplenium australasicum	Bird's Nest Fern	-	-	Fern (EG)											0.5	5																						
Astrotricha latifolia	-	-	-	Shrub (SG)																															0.5	10		
Atalaya salicifolia	Brush Whitewood	-	-	Tree (TG)																																		
Atractocarpus benthamianus	Native Gardenia	-	-	Shrub (SG)																																		
Auranticarpa rhombifolia	Diamond Leaf Pittosporum	-	-	Tree (TG)																																		
Austromyrtus dulcis	Midgen Berry	-	-	Shrub (SG)																																		
Austrosteenisia blackii var. blackii	Blood Vine	-	-	Other (OG)													0.1	1																				
Austrosteenisia glabristyla	Giant Blood Vine	-	-	Other (OG)									1	5																								
Baccharis halimifolia	Groundsel	Yes	Yes	-																							0.5	2										
Backhousia myrtifolia	Grey Myrtle	-	-	Shrub (SG)																																		
Baloghia inophylla	Brush Bloodwood	-	-	Tree (TG)																																		
Baumea articulata	Jointed Rush	-	-	Grass& Grass-like (GG)																																		
Baumea rubiginosa	Soft Twig Rush	-	-	Grass& Grass-like (GG)																																		
Beilschmiedia obtusifolia	Blush Walnut	-	-	Tree (TG)											1	1																						
Bidens pilosa	Cobbler's Pegs	Yes	Yes	-																																		

Species	Common Name	Exotic	High Threat Exotic	Growth Form Group	T1		T2		T3		T4		T5		T6		T7		T8		T9		T10		T11		T12		T13		T14		T15		T16		T17	
					C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A
Blechnum cartilagineum	Gristle Fern	-	-	Fern (EG)			**8**						**0.1**	**6**	**4**	**100**																						
Bosistoa pentacocca var. pentacocca	Ferny-leaved Bosistoa	-	-	Tree (TG)													**4**	**8**																				
Brachychiton acerifolius	Illawarra Flame Tree	-	-	Tree (TG)																																		
Breynia oblongifolia	Coffee Bush	-	-	Shrub (SG)					**0.5**	**6**	**5**		**0.1**	**1**											**0.5**	**15**	**0.1**	**1**							**2**	**20**	**1**	**20**
Buddleja davidii	Butterfly Bush	Yes	-	-																																		
Bursaria spinosa	Black Thorn	-	-	Shrub (SG)																																		
Caesalpinia subtropica	Corky Prickly-vine	-	-	Other (OG)																																		
Calamus muelleri	Lawyer Vine	-	-	Other (OG)									**1**	**4**																								
Calanthe triplicata	Christmas Orchid	-	-	Forb (F)																																		
Callistemon salignus	Willow Bottlebrush	-	-	Shrub (SG)	**0.5**	**1**																	**2**	**4**			**1**	**2**										
Callistemon viminalis	Weeping Bottlebrush	-	-	Tree (TG)																																		
Callitris columenllaris	Cypress Pine	-	-	Tree (TG)																																		
Cannabis spp.	Cannabis	Yes	-	-																																		
Carissa ovata	Conkerberry	-	-	Other (OG)																																		
Cassytha glabella	Dodder Laurel	-	-	Other (OG)																																		
Castanospermum australe	Black Bean	-	-	Tree (TG)																																		
Celastrus subspicata	Large-leaved Staff Vine	-	-	Other (OG)									**0.1**	**1**			**0.5**	**10**																				
Caldcluvia paniculosa	Soft Corkwood	-	-	Tree (TG)																																		
Callerya megasperma	Native Wistaria	-	-	Other (OG)																																		
Callicarpa pedunculata	Velvet Leaf	-	-	Shrub (SG)																																		
Calochlaena dubia	Rainbow Fern	-	-	Other (OG)																																		
Carex appressa	Tall Sedge	-	-	Grass& Grass-like (GG)																																		
Carex gaudichaudiana	-	-	-	Grass& Grass-like (GG)																																		
Carex longebrachiata	Sedge	-	-	Grass& Grass-like (GG)																																		

Species	Common Name	Exotic	High Threat Exotic	Growth Form Group	T1		T2		T3		T4		T5		T6		T7		T8		T9		T10		T11		T12		T13		T14		T15		T16		T17	
					C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A
Castanospora alphandii	Brown Tamarind	-	-	Tree (TG)																																		
Cayratia clematidea	Native Grape	-	-	Other (OG)																																		
Centella asiatica	Pennywort	-	-	Forb (F)																																		
Cheilanthes sieberi	Rock Fern	-	-	Fern (EG)																																		
Chloris gayana	Rhodes Grass	Yes	Yes	-																																		
Christella dentata	Binung	-	-	Fern (EG)																																		
Cinnamomum camphora	Camphor Laurel	Yes	Yes	-															0.1	1			0.1	1					0.1	10	0.1	3	0.5	3				
Cinnamomum oliveri	Oliver's Sassafras	-	-	Tree (TG)											1	2																						
Cinnamomum virens	Red-barked Sassafras	-	-	Tree (TG)																																		
Cissus antarctica	Kangaroo Vine	-	-	Other (OG)									2	10	0.5	2																			0.1	1		
Cissus hypoglauca	Water Vine	-	-	Other (OG)	0.1	1									10	10							0.5	1														
Cissus sterculiifolia	Yaroong	-	-	Other (OG)													0.1	1																				
Citharexylum spinosum	Fiddlewood	Yes	-	-																																		
Claoxylon australe	Brittlewood	-	-	Shrub (SG)																																		
Clematis aristata	Australian Clematis	-	-	Other (OG)																																		
Clerodendrum floribundum var. floribundum	-	-	-	Shrub (SG)																																		
Clerodendrum tomentosum	Hairy Clerodendron	-	-	Tree (TG)							0.1	1													0.1	1												
Commelina cyanea	Native Wandering Jew	-	-	Forb (F)																							0.1	10										
Commersonia bartramia	Brown Kurrajong	-	-	Tree (TG)																													2	4				
Conyza bonariensis	Flaxleaf Fleabane	Yes	-	-																																		
Cordyline petiolaris	Broad-leaved Palm Lily	-	-	Other (OG)											1	5																						
Cordyline rubra	Palm-lily	-	-	Other (OG)																																		
Corymbia intermedia	Pink Bloodwood	-	-	Tree (TG)	10		20		3	4	4	3	4	5			20	10																	6	1	1	1
Corymbia citriodora	Spotted Gum	-	-	Tree (TG)																																		
Corymbia torelliana	Cadaghi	Yes	-	-																																		
Crassocephalum crepidioides	Thickhead	Yes	-	-																																		
Crotalaria spp.	Rattlepod	Yes	-	-																																		

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					C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A
Croton verreauxii	Green Native Cascarilla	-	-	Shrub (SG)																																		
Cryptocarya bidwillii	Yellow Laurel	-	-	Tree (TG)																																		
Cryptocarya erythroxylon	Pigeonberry Ash	-	-	Tree (TG)																																		
Cryptocarya glaucescens	Jackwood	-	-	Tree (TG)			1	4					0.1	2	0.2	1	0.1	1																				
Cryptocarya microneura	Murrogun	-	-	Tree (TG)			0.5	1			0.5	1			2	10																	0.1	1				
Cryptocarya obovata	Pepperberry	-	-	Tree (TG)													0.5	1																				
Cryptocarya rigida	Forest Maple	-	-	Shrub (SG)			0.5	3					0.2	5	0.2	5	0.5	1																				
Cryptocarya triplinervis	Three-veined Cryptocarya	-	-	Tree (TG)											0.2	1																						
Cyathea cooperi	Straw Treefern	-	-	Other (OG)											1	1																						
Cyclophyllum longipetalum	Coast Canthium	-	-	Tree (TG)																																		
Cymbopogon refractus	Barbed Wire Grass	-	-	Grass& Grass-like (GG)									0.1	10																								
Cynodon dactylon	Couch	-	-	Grass& Grass-like (GG)																																		
Cyperus gracilis	Slender Flat-sedge	-	-	Grass& Grass-like (GG)																																		
Cyperus sp.	-	-	-	Grass& Grass-like (GG)																							0.1	5										
Cyperus tetraphyllus	-	-	-	Grass& Grass-like (GG)											0.1	2																						
Cupaniopsis anacardioides	Tuckeroo	-	-	Tree (TG)																																		
Cupaniopsis newmanii	Long-leaved Tuckeroo	-	-	Shrub (SG)											0.1	1																						
Cupaniopsis parvifolia	Small-leaved Tuckeroo	-	-	Tree (TG)					0.5	1																												
Cuttsia viburnea	Elderberry	-	-	Shrub (SG)																																		
Cuphea carthagensis	Columbian Waxweed	Yes	-	-																																		
Daucus carota	Carrot Weed	Yes	-	-																																		
Davallia solida var. pyxidata	Hare's Foot Fern	-	-	Fern (EG)													0.2	3																				
Daviesia arborea	Golden Pea Tree	-	-	Shrub (SG)																																		

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					C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A
Dawsonia superba var. pulchra	Giant Moss	-	-	Other (OG)																																		
Dendrobium spp.	-	-	-	Other (OG)					0.1	3																												
Denhamia bilocularis	Orangebark	-	-	Shrub (SG)																																		
Denhamia celastroides	Denhamia	-	-	Shrub (SG)																																		
Denhamia silvestris	Narrow-leaved Orangebark	-	-	Shrub (SG)					4	30	0.1	2	5																									
Desmodium rhytidophyllum	Hairy Trefoil	-	-	Forb (F)	0.2	7			0.1	3	0.1	30							0.1	2	0.1	20			0.1	5					0.1	1			0.1	100	0.1	50
Desmodium gunnii	-	-	-	Forb (F)																																		
Desmodium varians	Slender Tick-trefoil	-	-	Other (OG)																																		
Derris involuta	Native Derris	-	-	Other (OG)																																		
Dianella caerulea	Blue Flax-lily	-	-	Forb (F)																																		
Dianella revoluta	Blueberry Lily	-	-	Forb (F)					2	15	0.1	1	0.5	6																								
Dioscorea transversa	Native Yam	-	-	Other (OG)			0.1	1			1	15	0.2	20	0.1	5																						
Diospyros australis	Black Plum	-	-	Shrub (SG)																																		
Diospyros pentamera	Myrtle Ebony	-	-	Tree (TG)									0.1	1			2	5																				
Diploglottis australis	Native Tamarind	-	-	Tree (TG)											0.1	1																						
Diploglottis campbellii	Small-leaved Tamarind	-	-	Tree (TG)																																		
Dipodium variegatum	Blotched Hyacith-orchid	-	-	Forb (F)																																		
Dodonaea spp.	Hop-Bush	-	-	Shrub (SG)	0.1	1																																
Dolichandra unguis-cati	Cat's Claw Creeper	Yes	Yes	-																																		
Doodia aspera	Prickly Rasp Fern	-	-	Fern (EG)																													0.1	1				
Drypetes deplanchei	Yellow Tulipwood	-	-	Tree (TG)																																		
Duboisia myoporoides	Corkwood	-	-	Shrub (SG)																																		
Dysoxylum fraserianum	Rosewood	-	-	Tree (TG)																																		
Dysoxylum mollissimum subsp. molle	Red Bean	-	-	Tree (TG)																																		
Dysoxylum rufum	Hairy Rosewood	-	-	Tree (TG)																																		

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					C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A
Echinostephia aculeata	Prickly Tape Vine	-	-	Other (OG)							0.1	2																										
Endiandra discolor	Rose Walnut	-	-	Tree (TG)									0.5	1	0.1	1																						
Endiandra muelleri subsp. bracteata	Green-leaved Rose Walnut	-	-	Tree (TG)											1	5																						
Endiandra pubens	Hairy Walnut	-	-	Tree (TG)																																		
Elaeocarpus obovatus	Hard Quandong	-	-	Tree (TG)	0.5	2																																
Elaeocarpus reticulatus	Blueberry Ash	-	-	Shrub (SG)			15								0.5	1																						
Elattostachys nervosa	Beetroot Tree	-	-	Tree (TG)																																		
Eleusine indica	Indian Goosegrass	Yes	-	-																																		
Embelia australiana	-	-	-	Other (OG)			0.1	1							0.1	2	0.1	21																				
Emilia sonchifolia	Tasselflower	Yes	-	-																																		
Entolasia stricta	Wiry Panic	-	-	Grass& Grass-like (GG)	1	15			0.2	20			0.1	3																			0.1	50	0.1	10		
Eragrostis curvula	African Lovegass	Yes	Yes	-																																		
Erythrina verspertilio	Bat-wing Coral Tree	-	-	Tree (TG)																																		
Eucalyptus acmenoides	White Mahogany	-	-	Tree (TG)	2	1					10		25																						45		50	
Eucalyptus carnea	Broad-leaved Mahogany	-	-	Tree (TG)	10				3	7																												
Eucalyptus crebra	Narrow-leaved Ironbark	-	-	Tree (TG)													4	20																				
Eucalyptus grandis	Flooded Gum	-	-	Tree (TG)																	35		30		25				40	21	15		30					
Eucalyptus microcorys	Tallowwood	-	-	Tree (TG)	15		75		4	2	10		6				5	15																	1	2	1	1
Eucalyptus moluccana	Gum-topped Box	-	-	Tree (TG)																																		
Eucalyptus propinqua	Grey Gum	-	-	Tree (TG)					40								10	3																				
Eucalyptus pilularis	Blackbutt	-	-	Tree (TG)																					20		50	31										
Eucalyptus resinifera	Red Mahogany	-	-	Tree (TG)	15																																	
Eucalyptus robusta	Swamp Mahogany	-	-	Tree (TG)																																		
Eucalyptus saligna	Sydney Blue Gum	-	-	Tree (TG)							5	2							30	34							3	5			10							
Eucalyptus siderophloia	Northern Grey Ironbark	-	-	Tree (TG)									2	1																								

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					C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A
Eucalyptus tereticornis	Forest Red Gum	-	-	Tree (TG)																																		
Euphorbia spp.	Spurges	-	-	Forb (F)																																		
Eupomatia laurina	Bolwarra	-	-	Shrub (SG)			0.2	1					3	6	0.5	8									5													
Euroschinus falcatus var. falcatus	Ribbonwood	-	-	Tree (TG)							4	10	6		0.5	1	0.1	1															0.2	1				
Eustrephus latifolius	Wombat Berry	-	-	Other (OG)																																		
Flagellaria indica	Whip Vine	-	-	Other (OG)																																		
Gahnia aspera	Rough Saw-sedge	-	-	Grass& Grass-like (GG)											1	5	1	10															3	30			2	6
Gahnia sieberiana	Red-fruit Saw-sedge	-	-	Grass& Grass-like (GG)					7																													
Geitonoplesium cymosum	Scrambling Lily	-	-	Other (OG)			0.1	1	0.1	1			0.1	1																								
Geissois benthamiana	Red Carabeen	-	-	Tree (TG)									1	1																								
Geranium homeanum	Cranesbill	-	-	Forb (F)															0.1	20	0.1	50																
Glochidion ferdinandi	Cheese Tree	-	-	Tree (TG)					0.2	3			0.1	1							0.1	1	0.5	1	0.2	1					0.5	2						
Glochidion sumatranum	Umbrella Cheese Tree	-	-	Tree (TG)																																		
Glycine clandestina	Twining Glycine	-	-	Other (OG)	0.4	4			0.1	1	0.1	50	0.1	5					0.1	2															0.1	50	0.1	50
Glycine microphylla	Small-leaf Glycine	-	-	Other (OG)																																		
Gmelina leichhardtii	White Beech	-	-	Tree (TG)																																		
Gomphocarpus physocarpus	Balloon Cotton Bush	Yes	-	-															5		0.2	25	0.2	10			0.1	2										
Gossia bidwillii	Python Tree	-	-	Tree (TG)																																		
Gossia hillii	Scaly Myrtle	-	-	Shrub (SG)																																		
Grevillea robusta	Silky Oak	-	-	Tree (TG)																																		
Guioa semiglauca	Guioa	-	-	Tree (TG)			1	1			1	2	4	7	10	8	1	6																	3	3	0.5	1
Gymnostachys anceps	Settler's Flax	-	-	Forb (F)																																		
Ficus coronata	Creek Sandpaper Fig	-	-	Shrub (SG)																																		
Ficus fraseri	Sandpaper Fig	-	-	Tree (TG)											0.2	1																						

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					C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A
Ficus macrophylla	Moreton Bay Fig	-	-	Tree (TG)																																		
Ficus obliqua	Small-leaved Fig	-	-	Tree (TG)																																		
Ficus spp.	-	-	-	Tree (TG)									0.2	1																								
Ficus watkinsiana	Strangling Fig	-	-	Tree (TG)																					0.1	1												
Flindersia australis	Teak	-	-	Tree (TG)																																		
Flindersia bennettiana	Bennett's Ash	-	-	Tree (TG)																																		
Flindersia schottiana	Bumpy Ash	-	-	Tree (TG)																																		
Flindersia spp.	-	-	-	Tree (TG)																																		
Hardenbergia violacea	False Sarsaparilla	-	-	Other (OG)																																	0.1	2
Helicia ferruginea	Rusty Oak	-	-	Shrub (SG)											0.5	2																						
Hibbertia scandens	Snake Vine	-	-	Other (OG)	0.2	1	0.1	3																	0.2	3									0.1	1	0.1	1
Hibiscus heterophyllus	Native Rosella	-	-	Shrub (SG)																													0.5	1				
Hibiscus spendens	Splendid Hibiscus	-	-	Shrub (SG)							0.1	1																										
Hovea acutifolia	Purple Pea Bush	-	-	Shrub (SG)									1	20							1	12	1	10									2	5	2	15		
Hymenosporum flavum	Native Frangipani	-	-	Shrub (SG)											0.1	1																						
Hypolepis muelleri	Harsh Ground Fern	-	-	Fern (EG)							0.5	20	0.5	30																								
Imperata cylindrica	Blady Grass	-	-	Grass& Grass-like (GG)	0.1	1			6														75				35				75				60		60	
Jagera pseudorhus var. pseudorhus	Foambark Tree	-	-	Tree (TG)			0.2	2	0.2	3																							0.1	2				
Kennedia rubicunda	Dusky Coral Pea	-	-	Other (OG)																																		
Lantana camara	Lantana	Yes	Yes	-					15		4	20	5		0.5	10	7	50	0.2	3			2	1	10		0.5	1	15		5		5		2	10	2	10
Lastreopsis marginans	Bordered Shield Fern	-	-	Fern (EG)																																		
Legnephora moorei	Round-leaf Vine	-	-	Other (OG)																																		
Lepidosperma laterale	Variable Sword Sedge	-	-	Grass& Grass-like (GG)																																	0.1	1
Leucopogon juniperinus	Prickly beard-heath	-	-	Shrub (SG)	5		0.1	1	5				0.1	5			0.1	2					0.5	1							0.5	10			0.5	50	0.5	20
Ligustrum lucidum	Large-leaved Privet	Yes	Yes	-																																		

Species	Common Name	Exotic	High Threat Exotic	Growth Form Group	T1		T2		T3		T4		T5		T6		T7		T8		T9		T10		T11		T12		T13		T14		T15		T16		T17	
					C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A
Ligustrum sinense	Small-leaved Privet	Yes	Yes	-																																		
Linospadix monostachyos	Walking-stick Palm	-	-	Other (OG)											3	20																						
Litsea australis	Brown Bolly Gum	-	-	Tree (TG)																																		
Litsea reticulata	Bolly Gum	-	-	Tree (TG)											0.5	10																						
Livistona australis	Cabbage-tree Palm	-	-	Other (OG)																																		
Lomandra confertifolia	Mat-rush	-	-	Grass& Grass-like (GG)	30		5		25																												2	25
Lomandra filiformis	Wattle Mat-rush	-	-	Grass& Grass-like (GG)	30				25								2	100																			2	25
Lomandra hystrix	Creek Mat-rush	-	-	Grass& Grass-like (GG)																																		
Lomandra longifolia	Spiny-head Mat-rush	-	-	Grass& Grass-like (GG)							4	40	0.5	10	0.1	4									3	20	0.1	1					10		5			
Lomandra spp.	-	-	-	Grass& Grass-like (GG)									0.5	30																								
Lomatia arborescens	Tree Lomatia	-	-	Shrub (SG)																																		
Lophostemon confertus	Brush Box	-	-	Tree (TG)									0.5	1	1	1									40								1	3				
Lophestemon suaveolens	Swamp Box	-	-	Tree (TG)																																		
Macaranga tanarius	Macaranga	-	-	Tree (TG)																											0.5	1						
Maclura cochinchinensis	Cockspur Thorn	-	-	Other (OG)					0.1	1	0.1	1	0.1	1											1	20												
Macroptilium atropurpureum	Siratro	Yes	-	-															0.1	5																		
Mallotus philippensis	Red Kamala	-	-	Tree (TG)																															0.5	3	0.1	1
Marsdenia rostrata	Milk Vine	-	-	Other (OG)													0.1	1							1	1					0.1	2						
Megathyrsus maximus	Guinea Grass	Yes	Yes	-																																		
Meiogyne stenopetala subsp. stenopetala	-	-	-	Shrub (SG)			0.2	1																														
Melaleuca linarifolia	Snow-in-summer	-	-	Shrub (SG)																																		
Melaleuca styphelioides	Prickly Paperbark	-	-	Shrub (SG)																																		

Species	Common Name	Exotic	High Threat Exotic	Growth Form Group	T1		T2		T3		T4		T5		T6		T7		T8		T9		T10		T11		T12		T13		T14		T15		T16		T17	
					C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A
Melia azedarach	White Cedar	-	-	Tree (TG)																																		
Melicope hayesii	Small-leaved Doughwood	-	-	Shrub (SG)																																		
Melicope micrococca	White Euodia	-	-	Shrub (SG)																																		
Melodinus australis	Southern Melodinus	-	-	Other (OG)																																		
Melodinus acutiflorus	Bellbird Vine	-	-	Other (OG)											**3**	**10**																						
Mischocarpus australis	Red Pear Fruit	-	-	Tree (TG)											**0.1**	**1**																						
Morinda jasminoides	Sweet Morinda	-	-	Other (OG)									**0.1**	**3**																								
Murraya paniculata	Mock Orange	Yes	-	-																																		
Musa sp.	Banana	Yes	-	-																																		
Myrsine howittiana	Muttonwood	-	-	Shrub (SG)																																		
Myrsine variabilis	Variable Muttonwood	-	-	Shrub (SG)			**0.5**	**2**	**0.1**	**1**																							**0.1**	**1**				
Neolitsea australiensis	Grey Bolly Gum	-	-	Tree (TG)																																		
Neolitsea dealbata	Hairy-leaved Bolly Gum	-	-	Tree (TG)									**1**	**4**																								
Notelaea johnsonii	Veinless Mock Olive	-	-	Shrub (SG)																																		
Notelaea longifolia	Large Mock-olive	-	-	Tree (TG)																																		
Nymphaea caerulea	Blue Water Lily	Yes	-	-																																		
Nymphoides indica	Water Snowflake	-	-	Forb (F)																																		
Olea paniculata	Native Olive	-	-	Tree (TG)																																		
Onopordum acanthium	Scotch Thistle	Yes	-	-																																		
Oplismenus aemulus	Basket Grass	-	-	Grass& Grass-like (GG)																							**0.1**	**50**										
Oplismenus hirtellus	Wavyleaf Basketgrass	-	-	Grass& Grass-like (GG)																																		
Oplismenus imbecillis	-	-	-	Grass& Grass-like (GG)																																		
Orites excelsus	Prickly Ash	-	-	Tree (TG)																																		
Ottochloa gracillima	Graceful Grass	-	-	Grass& Grass-like (GG)			**0.1**	**10**			**0.2**	**100**	**0.5**	**200**	**0.1**	**20**	**0.1**	**400**							**0.1**	**50**					**0.1**	**20**	**0.1**	**400**	**0.1**	**200**	**0.1**	**200**

Species	Common Name	Exotic	High Threat Exotic	Growth Form	T1		T2		T3		T4		T5		T6		T7		T8		T9		T10		T11		T12		T13		T14		T15		T16		T17	
					C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A
Oxalis chnoodes	Wood Sorrel	-	-	Forb (F)					0.1	1																					0.1	50			0.1	50	0.1	50
Oxalis corniculata	Creeping Oxalis	Yes	-	-																																		
Ozothamnus diosmifolius	White Dogwood	-	-	Shrub (SG)					3	10																												
Palmeria foremanii	Big Scrub Anchor Vine	-	-	Other (OG)											0.1	5																						
Palmeria scandens	Anchor Vine	-	-	Other (OG)																																		
Pandorea jasminoides	Bower Vine	-	-	Other (OG)																																		
Pandorea pandorana	Wonga Wonga Vine	-	-	Other (OG)									0.1	1																								
Panicum pygmaeum	Pygmy Panic	-	-	Grass& Grass-like (GG)																																		
Parsonsia straminea	Monkey Rope	-	-	Other (OG)							0.1	1																										
Paspalum dilatatum	Dallas Grass	Yes	Yes	-					2	100	0.1	5													7		40											
Paspalum mandiocanum	Broad-leaved Paspalum	Yes	-	-																																		
Paspalum spp.	-	Yes	-	-																									90		10							
Paspalum urvillei	Vasey's Grass	Yes	-	-																																		
Passiflora edulis	Common Passionfruit	Yes	-	-																																		
Passiflora suberosa	Corky Passionflower	Yes	Yes	-																																		
Passiflora subpeltata	White Passionflower	Yes	-	-																																		
Pennisetum clandestinum	Kikuyu	Yes	-	-																							0.1	1										
Pentaceras australe	Bastard's Crow Ash	-	-	Tree (TG)																																		
Persoonia adenantha	Geebung	-	-	Shrub (SG)	2	6			0.5	4													3	3			2	5	3	3	2	4	5		0.5	3	0.5	2
Philydrum lanuginosum	Wooly Frogmouth	-	-	Forb (F)																																		
Phytolacca octandra	Inkweed	Yes	-	-																																		
Pilidiostigma glabrum	Plum Myrtle	-	-	Shrub (SG)							0.1	2	0.1	2	0.1	2	5	5																				
Pimelea latifolia	Rice Flower	-	-	Shrub (SG)																													1	0.1	6			
Pinus elliottii	Slash Pine	Yes	Yes	-																																		
Pittosporum multiflorum	Orange Thorn	-	-	Shrub (SG)									1	5	0.1	1																						
Pittosporum undulatum	Sweet Pittosporum	-	-	Shrub (SG)																																		
Planchonella australis	Black Apple	-	-	Tree (TG)																																		

Species	Common Name	Exotic	High Threat Exotic	Growth Form Group	T1		T2		T3		T4		T5		T6		T7		T8		T9		T10		T11		T12		T13		T14		T15		T16		T17	
					C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A
Platycerium bifurcatum	Elkhorn Fern	-	-	Fern (EG)																																		
Platycerium superbum	Staghorn	-	-	Fern (EG)													0.2	2							0.1	2												
Poa labillardierei	Common Tussock-grass	-	-	Grass& Grass-like (GG)																																		
Podocarpus elatus	Plum Pine	-	-	Tree (TG)																																		
Polyscias elegans	Celery Wood	-	-	Tree (TG)			0.1	1	0.2	3	0.1	2	0.1	2	1	1	8	40							0.1	1												
Polyscias murrayi	Pencil Cedar	-	-	Tree (TG)																																		
Pomax umbellata	-	-	-	Forb (F)	0.1	1																																
Pothos longipes	-	-	-	Forb (F)																																		
Pratia purpurascens	Whiteroot	-	-	Forb (F)	0.5	20			0.5	400	0.1	50	0.1	50																					0.1	100	0.1	100
Pseuderanthemum variabile	Pastel Flower	-	-	Forb (F)			0.1	100			0.5	200	0.1	100			0.1	50													0.1	50	0.1	200	0.1	200	0.1	500
Psychotria loniceroides	Hairy Psychotria	-	-	Shrub (SG)					0.1	1					0.1	1																						
Psydrax odorata	Shiny-leaved Canthium	-	-	Shrub (SG)																																		
Pteridium esculentum	Bracken	-	-	Fern (EG)	30		6						0.1	3	0.5	6			10		25		20		1	10	1	10	20		10		1	20	3	50	7	
Pyrrosia confluens var. confluens	Horseshoe Felt Fern	-	-	Fern (EG)																																		
Pyrrosia rupestris	Rock Felt Fern	-	-	Fern (EG)																																		
Quintinia verdonii	Grey Possumwood	-	-	Tree (TG)																																		
Rhodamnia rubescens	Scrub Turpentine	-	-	Shrub (SG)			1	1			0.2	2					0.5	1															1	1				
Rhodosphaera rhodanthema	Deep Yellowwood	-	-	Tree (TG)																																		
Ricinus communis	Castor Oil Plant	Yes	Yes	-																																		
Ripogonum album	White Supplejack	-	-	Other (OG)																																		
Ripogonum discolor	Prickly Supplejack	-	-	Other (OG)																																		
Rivina humilis	Pigeonberry	Yes	-	-																																		
Rubus moluccanus var. moluccanus	Molucca Raspberry	-	-	Shrub (SG)					0.1	1	0.1	1			0.1	1					0.1	4					0.1	1							0.1	2	0.1	1
Rubus parvifolius	Native Raspberry	-	-	Shrub (SG)																			0.5	50			0.1	2			1	50						
Rubus rosifolius	Rose-leaf Bramble	-	-	Shrub (SG)																																		
Sarcopteryx stipata	Steelwood	-	-	Tree (TG)																																		

Species	Common Name	Exotic	High Threat Exotic	Growth Form	T1		T2		T3		T4		T5		T6		T7		T8		T9		T10		T11		T12		T13		T14		T15		T16		T17	
					C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A
Scolopia braunii	Flintwood	-	-	Tree (TG)											2	2																						
Senecio madagascariensis	Fireweed	Yes	Yes	-															0.1	2																		
Senna acclinis	Rainforest cassia	-	-	Shrub (SG)																																		
Senna pendula var. glabrata	Easter Cassia	Yes	Yes	-																																		
Senna septemtrionalis	Smooth Senna	Yes	-	-					0.1	1													1	3											1	20	0.2	3
Setaria sphacelata	South African Pigeon Grass	Yes	-	-															90		85																	
Setaria verticillata	Hooked Bristlegrass	Yes	-	-																																		
Schoenoplectus validus	River Club Rush	-	-	Grass& Grass-like (GG)																																		
Sloanea australis	Maiden's Bush	-	-	Tree (TG)											3	5																						
Smilax australis	Barbed Wire Vine	-	-	Other (OG)			0.2	3	0.1	1	6		0.1	5			0.5	10									0.1	1			0.2	2	0.2	2	0.1	4	0.1	2
Smilax glyciphylla	Sweet Sarsaparilla	-	-	Other (OG)											0.1	2																						
Solanum aviculare	Kangaroo Apple	-	-	Shrub (SG)																																		
Solanum capsicoides	Devil's Applie	Yes	-	-																																		
Solanum hapalum	Hairy Solanum	-	-	Shrub (SG)							2	14	3	60			0.1	8													0.5	2						
Solanum mauritianum	Wild Tobacco	Yes	-	-															0.1	1							0.2	1			0.2	5						
Solanum seaforthianum	Climbing Nightshade	Yes	Yes	-																																		
Solanum stelligerum	Devil's Needles	-	-	Forb (F)																																		
Stephania japonica	Tape Vine	-	-	Other (OG)			0.1	1																							0.1	1						
Syncarpia glomulifera	Turpentine	-	-	Tree (TG)			5	1	3	6	2	2	10		10	2	10	10																			10	
Synoum glandulosum subsp. glandulosum	Scentless Rosewood	-	-	Shrub (SG)			0.5	2					5				0.2	1															0.1	2			0.2	3
Syzygium australe	Brush Cherry	-	-	Shrub (SG)																																		
Syzygium francisii	Giant Water Gum	-	-	Tree (TG)																																		
Syzygium moorei	Durroby	-	-	Tree (TG)																																		
Syzygium luehmannii	Riberry	-	-	Tree (TG)																																		
Syzygium oleosum	Blue Lilly Pilly	-	-	Shrub (SG)							0.1	1																					1	4				

Species	Common Name	Exotic	High Threat Exotic	Growth Form Group	T1		T2		T3		T4		T5		T6		T7		T8		T9		T10		T11		T12		T13		T14		T15		T16		T17	
					C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A
Tabernaemontana pandacaqui	Banana Bush	-	-	Shrub (SG)																																		
Tasmannia insipida	Brush Pepperbush	-	-	Shrub (SG)											0.1	1																						
Tephrosia glomeruliflora	Pink Tephrosia	Yes	-	-							0.5	4																										
Themeda triandra	Kangaroo Grass	-	-	Grass& Grass-like (GG)																																		
Toona ciliata	Red Cedar	-	-	Tree (TG)							0.2	1																										
Trema tomentosa var. aspera	Native Peach	-	-	Shrub (SG)																											0.1	1						
Tripladenia cunninghamii	Bush Lily	-	-	Tree (TG)																																		
Tristaniopsis laurina	Water Gum	-	-	Tree (TG)																																		
Trochocarpa laurina	Tree Heath	-	-	Tree (TG)	2	3	8		1	3			3	15	0.1	2																			0.5	3		
Trophis scandens	Burny Vine	-	-	Other (OG)			0.1	1			0.1	4																										
Typha spp.	-	-	-	Grass& Grass-like (GG)																																		
Urtica incisa	Scrub Nettle	-	-	Forb (F)																																		
Verbena bonariensis	Purpletop	Yes	-	-																							0.1	1										
Verbena rigida	Slender Vervain	Yes	-	-																																		
Veronica plebeia	Speedwell	-	-	Forb (F)																																		
Wikstroemia indica	Bootlace Bush	-	-	Shrub (SG)			0.1	1	0.1	1	0.1	2					0.1	1																				
Wilkiea huegeliana	Veiny Wilkiea	-	-	Shrub (SG)											0.1	3																			0.1	1		
Xanthorrhoea spp.	Grass Tree	-	-	Other (OG)																																		
Xanthostemon chrysanthus	Golden Penda	Yes	-	-																																		
Zieria smithii	Sandfly Zieria	-	-	Shrub (SG)	3	25	0.1	7	0.1	1													0.5	15	0.1	1					0.1	1			0.1	5	0.5	15

Species	Common Name	Exotic	High Threat Exotic	Growth Form Group	T18		T19		T20		T21		T22		T23		T24		T25		T26		T27		T28		T29		T30		T31		T32		T33		T34	
					C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A
Acacia falcata	Sickle Wattle	-	-	Shrub (SG)																																		
Acacia binervata	Two-veined Hickory	-	-	Tree (TG)																																		
Acacia irrorata	Green Wattle	-	-	Shrub (SG)																							1	1										

Species	Common Name	Exotic	High Threat Exotic	Growth Form Group	T18		T19		T20		T21		T22		T23		T24		T25		T26		T27		T28		T29		T30		T31		T32		T33		T34	
					C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A
Acacia maidenii	Maiden's Wattle	-	-	Tree (TG)					1	4																			2	5								
Acacia melanoxylon	Blackwood	-	-	Tree (TG)	2	6	1	5			1	6	1	4					0.5	5					0.5	2	0.5	2			0.1	1	0.5	50	0.1	2	1	5
Acacia spp.	Wattle	-	-	Shrub (SG)																																		
Acmena smithii	Lilly Pilly	-	-	Tree (TG)											2	2																						
Acronychia laevis	Hard Aspen	-	-	Tree (TG)																																		
Acronychia oblongifolia	White Aspen	-	-	Shrub (SG)																																		
Acronychia pubescens	Hairy Pubescens	-	-	Shrub (SG)													0.5	1																				
Acronychia suberosa	Corky Acronychia	-	-	Tree (TG)																																		
Acronychia spp.	-	-	-	Shrub (SG)																																		
Adiantum aethiopicum	Common Maidenhair	-	-	Fern (EG)																																		
Adiantum hispidulum	Rough Maidenhair	-	-	Fern (EG)																																		
Adiantum silvaticum	-	-	-	Fern (EG)																																		
Ageratina adenophora	Crofton Weed	Yes	Yes	-	0.1	5	0.5	10																														
Ageratina riparia	Mistflower	Yes	Yes	-							0.5	50																									0.1	>150
Ageratum houstonianum	Blue Billygoat Weed	Yes	-	-																																		
Akania bidwillii	Turnipwood	-	-	Tree (TG)																																		
Alchornea ilicifolia	Native Holly	-	-	Shrub (SG)					5																													
Alectryon subcinereus	Wild Quince	-	-	Shrub (SG)																																		
Allocasuarina torulosa	Forest She-oak	-	-	Tree (TG)													2	2	0.5	1	3	4	6				2	10			0.1	1	2	10	5			
Alocasia brisbanensis	Cunjevoi	-	-	Forb (F)																																		
Alphitonia petriei	White Ash	-	-	Tree (TG)			0.2	2																														
Alphitonia excelsa	Red Ash	-	-	Tree (TG)					0.1	1			0.1	1	2	2	0.5	1	0.1	2					1	3			0.3	4	1	5					3	20
Alpinia caerulea	Native Ginger	-	-	Forb (F)															1	10	0.5	4									0.1	1			0.5	1		
Alyxia ruscifolia	Prickly Alyxia	-	-	Shrub (SG)																																		
Andropogon virginicus	Whiskey Grass	Yes	Yes	-																																		
Aneilema acuminatum	-	-	-	Forb (F)																																		
Araucaria cunninghamii	Hoop Pine	-	-	Tree (TG)	0.1	1			15				1	1					0.1	1	0.1	5															0.1	1

Species	Common Name	Exotic	High Threat Exotic	Growth Form Group	T18		T19		T20		T21		T22		T23		T24		T25		T26		T27		T28		T29		T30		T31		T32		T33		T34	
					C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A
Araucaria bidwilli	Bunya Pine	-	-	Tree (TG)																																		
Archidendron grandiflorum	Pink Lace Flower	-	-	Tree (TG)													1	2																				
Archidendron mullerianum	Veiny Lace Flower	-	-	Tree (TG)																																		
Archontophoenix cunninghamiana	Bangalow Palm	-	-	Other (OG)													0.1	1							0.5	1			0.1	1								
Archirhodomyrtus beckleri	Rose Myrtle	-	-	Shrub (SG)									7		1	3	0.5	2							0.1	2			2	15	1	10			0.1	5	0.1	2
Arthropteris tenella	Climbing Fern	-	-	Fern (EG)					0.1	1																												
Asparagus spp.	-	Yes	Yes	-																																		
Asplenium australasicum	Bird's Nest Fern	-	-	Fern (EG)																																		
Astrotricha latifolia	-	-	-	Shrub (SG)					0.1	1																												
Atalaya salicifolia	Brush Whitewood	-	-	Tree (TG)																																		
Atractocarpus benthamianus	Native Gardenia	-	-	Shrub (SG)																																		
Auranticarpa rhombifolia	Diamond Leaf Pittosporum	-	-	Tree (TG)																																		
Austromyrtus dulcis	Midgen Berry	-	-	Shrub (SG)																																		
Austrosteenisia blackii var. blackii	Blood Vine	-	-	Other (OG)																																		
Austrosteenisia glabristyla	Giant Blood Vine	-	-	Other (OG)																																		
Baccharis halimifolia	Groundsel	Yes	Yes	-							0.1	1																										
Backhousia myrtifolia	Grey Myrtle	-	-	Shrub (SG)																																		
Baloghia inophylla	Brush Bloodwood	-	-	Tree (TG)																																		
Baumea articulata	Jointed Rush	-	-	Grass& Grass-like (GG)																																		
Baumea rubiginosa	Soft Twig Rush	-	-	Grass& Grass-like (GG)																																		
Beilschmiedia obtusifolia	Blush Walnut	-	-	Tree (TG)																																		
Bidens pilosa	Cobbler's Pegs	Yes	Yes	-																																		
Blechnum cartilagineum	Gristle Fern	-	-	Fern (EG)											10		0.5	20			15		3	50	20				7						15		0.1	50
Bosistoa pentacocca var. pentacocca	Ferny-leaved Bosistoa	-	-	Tree (TG)																																		
Brachychiton acerifolius	Illawarra Flame Tree	-	-	Tree (TG)																																		

Species	Common Name	Exotic	High Threat Exotic	Growth Form Group	T18		T19		T20		T21		T22		T23		T24		T25		T26		T27		T28		T29		T30		T31		T32		T33		T34	
					C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A
Breynia oblongifolia	Coffee Bush	-	-	Shrub (SG)	**0.5**	**7**	**0.2**	**2**	**3**	**15**	**5**		**0.1**	**1**					**0.5**	**20**	**0.1**	**1**	**0.5**	**10**	**0.5**	**10**	**5**		**1**	**15**	**0.2**	**1**	**0.5**	**1**	**1**	**20**	**0.5**	**20**
Buddleja davidii	Butterfly Bush	Yes	-	-																																		
Bursaria spinosa	Black Thorn	-	-	Shrub (SG)																											**3**	**30**						
Caesalpinia subtropica	Corky Prickly-vine	-	-	Other (OG)																																		
Calamus muelleri	Lawyer Vine	-	-	Other (OG)																																		
Calanthe triplicata	Christmas Orchid	-	-	Forb (F)																																		
Callistemon salignus	Willow Bottlebrush	-	-	Shrub (SG)			**1**	**1**	**6**		**2**	**10**															**4**	**15**	**30**									
Callistemon viminalis	Weeping Bottlebrush	-	-	Tree (TG)																																		
Callitris columenllaris	Cypress Pine	-	-	Tree (TG)																																		
Cannabis spp.	Cannabis	Yes	-	-																																		
Carissa ovata	Conkerberry	-	-	Other (OG)																																		
Cassytha glabella	Dodder Laurel	-	-	Other (OG)									**0.1**	**1**																								
Castanospermum australe	Black Bean	-	-	Tree (TG)																																		
Celastrus subspicata	Large-leaved Staff Vine	-	-	Other (OG)															**0.1**	**4**	**0.1**	**1**													**0.1**	**1**		
Caldcluvia paniculosa	Soft Corkwood	-	-	Tree (TG)																																		
Callerya megasperma	Native Wistaria	-	-	Other (OG)																																		
Callicarpa pedunculata	Velvet Leaf	-	-	Shrub (SG)																																		
Calochlaena dubia	Rainbow Fern	-	-	Other (OG)																																		
Carex appressa	Tall Sedge	-	-	Grass& Grass-like (GG)																																		
Carex gaudichaudiana	-	-	-	Grass& Grass-like (GG)																																		
Carex longebrachiata	Sedge	-	-	Grass& Grass-like (GG)																																		
Castanospora alphandii	Brown Tamarind	-	-	Tree (TG)																																		
Cayratia clematidea	Native Grape	-	-	Other (OG)																																		
Centella asiatica	Pennywort	-	-	Forb (F)							**0.1**	**20**															**0.1**	**10**										
Cheilanthes sieberi	Rock Fern	-	-	Fern (EG)																									**0.1**	**10**										

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					C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A
Chloris gayana	Rhodes Grass	Yes	Yes	-							2	40																										
Christella dentata	Binung	-	-	Fern (EG)																																		
Cinnamomum camphora	Camphor Laurel	Yes	Yes	-											0.5	1					0.1	1					0.1	1							0.1	1		
Cinnamomum oliveri	Oliver's Sassafras	-	-	Tree (TG)																																		
Cinnamomum virens	Red-barked Sassafras	-	-	Tree (TG)																																		
Cissus antarctica	Kangaroo Vine	-	-	Other (OG)			0.1	1							0.1	1	0.5	20	0.5	20	1	50	0.1	10			0.2	1	0.3	5	0.1	2			3	100	0.5	20
Cissus hypoglauca	Water Vine	-	-	Other (OG)									1	1																	0.1	1			0.1	10		
Cissus sterculiifolia	Yaroong	-	-	Other (OG)																																		
Citharexylum spinosum	Fiddlewood	Yes	-	-																																		
Claoxylon australe	Brittlewood	-	-	Shrub (SG)																																		
Clematis aristata	Australian Clematis	-	-	Other (OG)																																		
Clerodendrum floribundum var. floribundum	-	-	-	Shrub (SG)																													0.1	1				
Clerodendrum tomentosum	Hairy Clerodendron	-	-	Tree (TG)																																		
Commelina cyanea	Native Wandering Jew	-	-	Forb (F)																																		
Commelina diffusa	Snake Vine	-	-	Forb (F)																							0.1	1										
Commersonia bartramia	Brown Kurrajong	-	-	Tree (TG)																																		
Conyza bonariensis	Flaxleaf Fleabane	Yes	-	-																																		
Cordyline petiolaris	Broad-leaved Palm Lily	-	-	Other (OG)													0.5	2																				
Cordyline rubra	Palm-lily	-	-	Other (OG)																																		
Corymbia intermedia	Pink Bloodwood	-	-	Tree (TG)	0.2	1					10		10		5		1	1	10		10		3	2			1	1			15		4	5	3	2		
Corymbia citriodora	Spotted Gum	-	-	Tree (TG)	40	18																																
Corymbia torelliana	Cadaghi	Yes	Yes	-																																		
Crassocephalum crepidioides	Thickhead	Yes	-	-																																		
Crotalaria spp.	Rattlepod	Yes	-	-							0.1	3																										
Croton verreauxii	Green Native Cascarilla	-	-	Shrub (SG)																																		
Cryptocarya bidwillii	Yellow Laurel	-	-	Tree (TG)																																		
Cryptocarya erythroxylon	Pigeonberry Ash	-	-	Tree (TG)																																		

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					C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A
Cryptocarya glaucescens	Jackwood	-	-	Tree (TG)									0.1	2	1	4	0.2	1	0.5	20	0.1	1	1	2					0.5	4								
Cryptocarya microneura	Murrogun	-	-	Tree (TG)									0.1	1	20		0.1	5	1	2																		
Cryptocarya obovata	Pepperberry	-	-	Tree (TG)															0.1	2			0.1	1					0.1	1								
Cryptocarya rigida	Forest Maple	-	-	Shrub (SG)											1	5					0.5	1	0.1	1							0.2	1					1	15
Cryptocarya triplinervis	Three-veined Cryptocarya	-	-	Tree (TG)																																		
Cyathea cooperi	Straw Treefern	-	-	Other (OG)																																		
Cyclophyllum longipetalum	Coast Canthium	-	-	Tree (TG)																											7							
Cymbopogon refractus	Barbed Wire Grass	-	-	Grass& Grass-like (GG)									0.1	10																			0.1	20				
Cynodon dactylon	Couch	-	-	Grass& Grass-like (GG)																																		
Cyperus gracilis	Slender Flat-sedge	-	-	Grass& Grass-like (GG)																																		
Cyperus sp.	-	-	-	Grass& Grass-like (GG)																							0.1	30										
Cyperus tetraphyllus	-	-	-	Grass& Grass-like (GG)																																		
Cupaniopsis anacardioides	Tuckeroo	-	-	Tree (TG)																																		
Cupaniopsis newmanii	Long-leaved Tuckeroo	-	-	Shrub (SG)													1	2	0.1	1																		
Cupaniopsis parvifolia	Small-leaved Tuckeroo	-	-	Tree (TG)					0.1	1																												
Cuttsia viburnea	Elderberry	-	-	Shrub (SG)																																		
Cuphea carthagensis	Columbian Waxweed	Yes	-	-																																		
Daucus carota	Carrot Weed	Yes	-	-							0.1	2																										
Davallia solida var. pyxidata	Hare's Foot Fern	-	-	Fern (EG)																																		
Daviesia arborea	Golden Pea Tree	-	-	Shrub (SG)																																		
Dawsonia superba var. pulchra	Giant Moss	-	-	Other (OG)																									0.1	1								
Dendrobium spp.	-	-	-	Other (OG)																																		
Denhamia bilocularis	Orangebark	-	-	Shrub (SG)																																		

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					C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A
Denhamia celastroides	Denhamia	-	-	Shrub (SG)													0.1	1																				
Denhamia silvestris	Narrow-leaved Orangebark	-	-	Shrub (SG)	0.1	2							0.1	1					3	50	0.1	2			1	10					5		0.1	1	2	50		
Desmodium rhytidophyllum	Hairy Trefoil	-	-	Forb (F)	0.1	100					0.1	200	0.1	15					0.1	1	0.1	1			0.1	10	0.1	50			0.1	30	0.1	30			0.1	20
Desmodium gunnii	-	-	-	Forb (F)	0.1	50							0.1	1					0.1	1							0.1	10			0.1	5						
Desmodium varians	Slender Tick-trefoil	-	-	Other (OG)																																		
Derris involuta	Native Derris	-	-	Other (OG)																																		
Dianella caerulea	Blue Flax-lily	-	-	Forb (F)					0.1	1	0.1	2	0.5	20					0.1	1							0.1	1			0.1	10	0.1	30				
Dianella revoluta	Blueberry Lily	-	-	Forb (F)	0.5	10																															0.2	10
Dioscorea transversa	Native Yam	-	-	Other (OG)					0.1	8					0.1	10	0.1	50			0.1	20			0.1	20			0.2	20	0.1	1			0.1	2		
Diospyros australis	Black Plum	-	-	Shrub (SG)																																		
Diospyros pentamera	Myrtle Ebony	-	-	Tree (TG)																																		
Diploglottis australis	Native Tamarind	-	-	Tree (TG)																					0.5	2												
Diploglottis campbellii	Small-leaved Tamarind	-	-	Tree (TG)																																		
Dipodium variegatum	Blotched Hyacith-orchid	-	-	Forb (F)																																		
Dodonaea spp.	Hop-Bush	-	-	Shrub (SG)																							0.2	1					10					
Dolichandra unguis-cati	Cat's Claw Creeper	Yes	Yes	-																																		
Doodia aspera	Prickly Rasp Fern	-	-	Fern (EG)					3	150																							3	200				
Drypetes deplanchei	Yellow Tulipwood	-	-	Tree (TG)																																		
Duboisia myoporoides	Corkwood	-	-	Shrub (SG)																																		
Dysoxylum fraserianum	Rosewood	-	-	Tree (TG)																																		
Dysoxylum mollissimum subsp. molle	Red Bean	-	-	Tree (TG)																																		
Dysoxylum rufum	Hairy Rosewood	-	-	Tree (TG)																																		
Echinostephia aculeata	Prickly Tape Vine	-	-	Other (OG)					0.1	1					0.1	3													0.2	5								
Endiandra discolor	Rose Walnut	-	-	Tree (TG)																																		
Endiandra muelleri subsp. bracteata	Green-leaved Rose Walnut	-	-	Tree (TG)																																		

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					C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A
Endiandra pubens	Hairy Walnut	-	-	Tree (TG)																	0.5	1																
Elaeocarpus obovatus	Hard Quandong	-	-	Tree (TG)									0.1	1																	1	2						
Elaeocarpus reticulatus	Blueberry Ash	-	-	Shrub (SG)									3	10																	0.5	2						
Elattostachys nervosa	Beetroot Tree	-	-	Tree (TG)																																		
Eleusine indica	Indian Goosegrass	Yes	-	-																																		
Embelia australiana	-	-	-	Other (OG)													0.1	2	0.1	1	0.1	1			0.1	1											0.1	2
Emilia sonchifolia	Tasselflower	Yes	-	-							0.5	20																										
Entolasia stricta	Wiry Panic	-	-	Grass& Grass-like (GG)					1	40																					0.1	50	0.1	20				
Eragrostis curvula	African Lovegass	Yes	Yes	-							0.1	1																										
Erythrina verspertilio	Bat-wing Coral Tree	-	-	Tree (TG)																							0.1	1										
Eucalyptus acmenoides	White Mahogany	-	-	Tree (TG)	0.5	1							50						20		20		8		40						25				50		20	
Eucalyptus carnea	Broad-leaved Mahogany	-	-	Tree (TG)																							35											
Eucalyptus crebra	Narrow-leaved Ironbark	-	-	Tree (TG)																																		
Eucalyptus grandis	Flooded Gum	-	-	Tree (TG)			50								20		40						30						2	1							10	
Eucalyptus microcorys	Tallowwood	-	-	Tree (TG)	0.5	1	1	4					0.5	1			2	2	15		5		3	1					20		8		3	2	0.1	1	6	
Eucalyptus moluccana	Gum-topped Box	-	-	Tree (TG)																																		
Eucalyptus propinqua	Grey Gum	-	-	Tree (TG)							40		3	1													20						30					
Eucalyptus pilularis	Blackbutt	-	-	Tree (TG)																																		
Eucalyptus resinifera	Red Mahogany	-	-	Tree (TG)																	25																	
Eucalyptus robusta	Swamp Mahogany	-	-	Tree (TG)																																		
Eucalyptus saligna	Sydney Blue Gum	-	-	Tree (TG)																																		
Eucalyptus siderophloia	Northern Grey Ironbark	-	-	Tree (TG)	0.5	3					1	1			2	1			5								7				5				0.5	1		
Eucalyptus tereticornis	Forest Red Gum	-	-	Tree (TG)																																		
Euphorbia spp.	Spurges	-	-	Forb (F)																																		
Eupomatia laurina	Bolwarra	-	-	Shrub (SG)											1	6	5		1	10																		

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					C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A
Euroschinus falcatus var. falcatus	Ribbonwood	-	-	Tree (TG)									0.1	1	2	6			0.5	1	0.5	4			2	12									0.1	1		
Eustrephus latifolius	Wombat Berry	-	-	Other (OG)									0.1	5					0.1	1			0.1	1	0.1	1									0.1	50		
Flagellaria indica	Whip Vine	-	-	Other (OG)																																		
Gahnia aspera	Rough Saw-sedge	-	-	Grass& Grass-like (GG)					4	30	0.1	1					0.1	4															0.1	1				
Gahnia sieberiana	Red-fruit Saw-sedge	-	-	Grass& Grass-like (GG)																															0.1	1		
Geitonoplesium cymosum	Scrambling Lily	-	-	Other (OG)					0.1	1									0.1	2									0.1	5	0.1	5						
Geissois benthamiana	Red Carabeen	-	-	Tree (TG)																																		
Geranium homeanum	Cranesbill	-	-	Forb (F)							0.1	50																					0.1	5				
Glochidion ferdinandi	Cheese Tree	-	-	Tree (TG)					0.1	2	0.1	2			1	1	0.1	1							0.2	3			0.3	2			0.1	20			1	10
Glochidion sumatranum	Umbrella Cheese Tree	-	-	Tree (TG)																																		
Glycine clandestina	Twining Glycine	-	-	Other (OG)	0.1	100	0.1	50			0.1	1							0.1	10					0.1	1	0.1	1			0.1	5	0.1	5			0.1	1
Glycine microphylla	Small-leaf Glycine	-	-	Other (OG)									0.1	1																								
Gmelina leichhardtii	White Beech	-	-	Tree (TG)																																		
Gomphocarpus physocarpus	Balloon Cotton Bush	Yes	-	-							0.1	50																							0.2	200	0.1	5
Gossia bidwillii	Python Tree	-	-	Tree (TG)																																		
Gossia hillii	Scaly Myrtle	-	-	Shrub (SG)																																		
Grevillea robusta	Silky Oak	-	-	Tree (TG)																																		
Guioa semiglauca	Guioa	-	-	Tree (TG)					1	5			0.5	2	2	6	8		4	10	8		1	1	2	5			0.1	1	0	5			3	10		
Gymnostachys anceps	Settler's Flax	-	-	Forb (F)																													0.1	1				
Ficus coronata	Creek Sandpaper Fig	-	-	Shrub (SG)																																		
Ficus fraseri	Sandpaper Fig	-	-	Tree (TG)																																		
Ficus macrophylla	Moreton Bay Fig	-	-	Tree (TG)																																		
Ficus obliqua	Small-leaved Fig	-	-	Tree (TG)																																		
Ficus spp.	-	-	-	Tree (TG)																																		

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					C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A
Ficus watkinsiana	Strangling Fig	-	-	Tree (TG)																																		
Flindersia australis	Teak	-	-	Tree (TG)																																		
Flindersia bennettiana	Bennett's Ash	-	-	Tree (TG)																																		
Flindersia schottiana	Bumpy Ash	-	-	Tree (TG)													**0.5**	**2**	**1**	**1**																	**0.5**	**2**
Flindersia spp.	-	-	-	Tree (TG)					**0.1**	**1**																												
Hardenbergia violacea	False Sarsaparilla	-	-	Other (OG)									**0.1**	**1**																			**0.1**	**2**				
Helicia ferruginea	Rusty Oak	-	-	Shrub (SG)																																		
Hibbertia scandens	Snake Vine	-	-	Other (OG)	**0.5**	**5**							**2**	**10**							**0.1**	**1**					**0.1**	**1**	**0.1**	**1**			**0.2**	**20**	**0.1**	**1**	**0.2**	**20**
Hibiscus heterophyllus	Native Rosella	-	-	Shrub (SG)					**0.5**	**12**																												
Hibiscus spendens	Splendid Hibiscus	-	-	Shrub (SG)																																		
Hovea acutifolia	Purple Pea Bush	-	-	Shrub (SG)	**0.5**	**1**			**1**	**15**					**1**	**10**																					**0.1**	**1**
Hymenosporum flavum	Native Frangipani	-	-	Shrub (SG)																																		
Hypolepis muelleri	Harsh Ground Fern	-	-	Fern (EG)																																		
Imperata cylindrica	Blady Grass	-	-	Grass& Grass-like (GG)	**20**		**30**				**70**		**0.5**	**20**					**3**	**100**							**40**				**3**	**200**	**30**				**0.5**	**>50**
Jagera pseudorhus var. pseudorhus	Foambark Tree	-	-	Tree (TG)					**0.5**	**8**					**0.1**	**10**			**0.1**	**20**	**0.5**	**4**	**0.1**	**5**	**0.1**	**3**									**2**	**10**	**0.1**	**1**
Kennedia rubicunda	Dusky Coral Pea	-	-	Other (OG)																							**0.2**	**1**					**0.1**	**20**				
Lantana camara	Lantana	Yes	Yes	-	**6**		**40**		**6**		**2**	**30**	**0.5**	**10**	**3**	**25**	**1**	**10**	**5**		**0.5**	**10**	**50**		**6**		**30**		**3**	**30**	**1**	**20**	**1**	**10**	**30**		**5**	
Lastreopsis marginans	Bordered Shield Fern	-	-	Fern (EG)																																		
Legnephora moorei	Round-leaf Vine	-	-	Other (OG)																																		
Lepidosperma laterale	Variable Sword Sedge	-	-	Grass& Grass-like (GG)																													**0.3**	**1**				
Leucopogon juniperinus	Prickly beard-heath	-	-	Shrub (SG)			**4**	**20**			**0.5**	**10**	**2**	**30**					**1**	**10**					**0.1**	**5**	**0.2**	**7**			**0.5**	**20**	**0.2**	**10**			**0.5**	**40**
Ligustrum lucidum	Large-leaved Privet	Yes	Yes	-							**0.1**	**2**																										
Ligustrum sinense	Small-leaved Privet	Yes	Yes	-																																		
Linospadix monostachyos	Walking-stick Palm	-	-	Other (OG)																																		
Litsea australis	Brown Bolly Gum	-	-	Tree (TG)																																		

Species	Common Name	Exotic	High Threat Exotic	Growth Form Group	T18		T19		T20		T21		T22		T23		T24		T25		T26		T27		T28		T29		T30		T31		T32		T33		T34	
					C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A
Litsea reticulata	Bolly Gum	-	-	Tree (TG)																																		
Livistona australis	Cabbage-tree Palm	-	-	Other (OG)																																		
Lomandra confertifolia	Mat-rush	-	-	Grass& Grass-like (GG)									**30**						**0.5**	**10**	**0.1**	**30**					**1**	**5**	**1**	**20**	**10**		**1**	**20**				
Lomandra filiformis	Wattle Mat-rush	-	-	Grass& Grass-like (GG)															**0.1**	**10**			**0.1**	**4**			**1**	**20**										
Lomandra hystrix	Creek Mat-rush	-	-	Grass& Grass-like (GG)																																		
Lomandra longifolia	Spiny-head Mat-rush	-	-	Grass& Grass-like (GG)					**2**	**20**	**0.5**	**4**			**3**	**50**	**0.2**	**4**					**0.1**	**4**	**3**	**100**			**1**	**20**			**6**		**0.1**	**30**	**0.5**	**20**
Lomandra spp.	-	-	-	Grass& Grass-like (GG)	**2**	**20**																																
Lomatia arborescens	Tree Lomatia	-	-	Shrub (SG)																																		
Lophostemon confertus	Brush Box	-	-	Tree (TG)	**1**	**6**			**70**		**2**	**1**	**2**	**1**	**10**		**15**										**0.1**	**1**	**40**									
Lophostemon suaveolens	Swamp Box	-	-	Tree (TG)																																		
Macaranga tanarius	Macaranga	-	-	Tree (TG)																			**0.1**	**1**									**0.1**	**5**				
Maclura cochinchinensis	Cockspur Thorn	-	-	Other (OG)	**0.5**	**2**			**0.1**	**1**									**1**	**10**	**0.5**	**10**	**1**	**50**	**0.5**	**8**			**0.2**	**2**	**0.3**	**2**			**0.5**	**20**	**0.1**	**8**
Macroptilium atropurpureum	Siratro	Yes	-	-																																		
Mallotus philippensis	Red Kamala	-	-	Tree (TG)							**0.1**	**1**					**0.5**	**2**					**0.2**	**1**	**0.5**	**2**			**0.1**	**2**					**0.1**	**2**	**1**	**20**
Marsdenia rostrata	Milk Vine	-	-	Other (OG)					**0.1**	**1**									**0.1**	**5**																		
Megathyrsus maximus	Guinea Grass	Yes	Yes	-																																		
Meiogyne stenopetala subsp. stenopetala	-	-	-	Shrub (SG)																																		
Melaleuca linarifolia	Snow-in-summer	-	-	Shrub (SG)																																		
Melaleuca styphelioides	Prickly Paperbark	-	-	Shrub (SG)																																		
Melia azedarach	White Cedar	-	-	Tree (TG)																																		
Melicope hayesii	Small-leaved Doughwood	-	-	Shrub (SG)									**1**	**10**			**0.1**	**2**																				
Melicope micrococca	White Euodia	-	-	Shrub (SG)																																		

Species	Common Name	Exotic	High Threat Exotic	Growth Form Group	T18		T19		T20		T21		T22		T23		T24		T25		T26		T27		T28		T29		T30		T31		T32		T33		T34	
					C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A
Melodinus australis	Southern Melodinus	-	-	Other (OG)																																		
Melodinus acutiflorus	Bellbird Vine	-	-	Other (OG)													0.1	2																				
Mischocarpus australis	Red Pear Fruit	-	-	Tree (TG)																																		
Morinda jasminoides	Sweet Morinda	-	-	Other (OG)									0.1	1	0.1	3	0.1	50	0.1	1	0.1	10			0.1	5			0.1	10								
Murraya paniculata	Mock Orange	Yes		-																																		
Musa sp.	Banana	Yes	-	-																																		
Myrsine howittiana	Muttonwood	-	-	Shrub (SG)																																		
Myrsine variabilis	Variable Muttonwood	-	-	Shrub (SG)	0.1	1			0.1	2									0.5	1							0.1	1	0.2	5	0.1	10						
Neolitsea australiensis	Grey Bolly Gum	-	-	Tree (TG)																											0.1	1					0.1	1
Neolitsea dealbata	Hairy-leaved Bolly Gum	-	-	Tree (TG)											0.5	1	0.5	2			0.1	1	0.1	1														
Notelaea johnsonii	Veinless Mock Olive	-	-	Shrub (SG)																																		
Notelaea longifolia	Large Mock-olive	-	-	Tree (TG)											0.1	1															0.2	1						
Nymphoides indica	Water Snowflake	-	-	Forb (F)																																		
Olea paniculata	Native Olive	-	-	Tree (TG)																																		
Onopordum acanthium	Scotch Thistle	Yes	-	-							0.1	2																										
Oplismenus aemulus	Basket Grass	-	-	Grass& Grass-like (GG)							0.2	400															0.1	20					0.1	10			0.1	50
Oplismenus imbecillis	-	-	-	Grass& Grass-like (GG)																																		
Oplismenus hirtellus	Wavyleaf Basketgrass	-	-	Grass& Grass-like (GG)					0.1	10																												
Orites excelsus	Prickly Ash	-	-	Tree (TG)																																		
Ottochloa gracillima	Graceful Grass	-	-	Grass& Grass-like (GG)	0.1	200	0.2	100	0.1	200			0.1	20	0.1	20	0.1	50	0.1	50	0.1	50	0.1	150	0.1	30			0.2	200	0.1	100	0.1	20			0.1	>150
Oxalis chnoodes	Wood Sorrel	-	-	Forb (F)							0.1	50																										
Oxalis corniculata	Creeping Oxalis	Yes	-	-																																	0.1	2
Ozothamnus diosmifolius	White Dogwood	-	-	Shrub (SG)																																		
Palmeria foremanii	Big Scrub Anchor Vine	-	-	Other (OG)																																		

Species	Common Name	Exotic	High Threat Exotic	Growth Form Group	T18		T19		T20		T21		T22		T23		T24		T25		T26		T27		T28		T29		T30		T31		T32		T33		T34	
					C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A
Palmeria scandens	Anchor Vine	-	-	Other (OG)																																		
Pandorea jasminoides	Bower Vine	-	-	Other (OG)																																		
Pandorea pandorana	Wonga Wonga Vine	-	-	Other (OG)															**0.1**	**1**											**0.1**	**1**						
Panicum pygmaeum	Pygmy Panic	-	-	Grass& Grass-like (GG)																																		
Parsonsia straminea	Monkey Rope	-	-	Other (OG)							**2**	**10**					**0.5**	**10**															**0.1**	**1**				
Paspalum dilatatum	Dallas Grass	Yes	Yes	-																																		
Paspalum mandiocanum	Broad-leaved Paspalum	Yes	-	-																																		
Paspalum spp.	-	Yes	-	-	**5**																						**0.1**	**5**										
Paspalum urvillei	Vasey's Grass	Yes	-	-																																		
Passiflora edulis	Common Passionfruit	Yes	-	-																																		
Passiflora suberosa	Corky Passionflower	Yes	Yes	-																																		
Passiflora subpeltata	White Passionflower	Yes	-	-																																		
Pennisetum clandestinum	Kikuyu	Yes	-	-																																		
Pentaceras australe	Bastard's Crow Ash	-	-	Tree (TG)																																		
Persoonia adenantha	Geebung	-	-	Shrub (SG)									**1**	**10**													**2**	**4**					**1**	**2**			**0.1**	**4**
Philydrum lanuginosum	Wooly Frogmouth	-	-	Forb (F)																																		
Phytolacca octandra	Inkweed	Yes	-	-																																		
Pilidiostigma glabrum	Plum Myrtle	-	-	Shrub (SG)											**0.1**	**1**	**2**	**15**			**2**	**10**																
Pimelea latifolia	Rice Flower	-	-	Shrub (SG)	**0.1**	**1**																					**0.1**	**1**										
Pinus elliottii	Slash Pine	Yes	Yes	-																																		
Pittosporum multiflorum	Orange Thorn	-	-	Shrub (SG)													**0.2**	**1**	**0.1**	**1**																		
Pittosporum undulatum	Sweet Pittosporum	-	-	Shrub (SG)					**0.1**	**1**			**0.1**	**1**					**0.1**	**1**	**0.1**	**1**					**0.2**	**1**	**0.5**	**2**	**0.1**	**1**					**0.2**	**1**
Planchonella australis	Black Apple	-	-	Tree (TG)																																		
Platycerium bifurcatum	Elkhorn Fern	-	-	Fern (EG)															**0.1**	**1**	**0.1**	**1**													**0.1**	**1**		
Platycerium superbum	Staghorn	-	-	Fern (EG)					**0.1**	**1**					**0.1**	**3**																						
Poa labillardierei	Common Tussock-grass	-	-	Grass& Grass-like (GG)																													**3**	**1**				

Species	Common Name	Exotic	High Threat Exotic	Growth Form Group	T18		T19		T20		T21		T22		T23		T24		T25		T26		T27		T28		T29		T30		T31		T32		T33		T34	
					C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A
Podocarpus elatus	Plum Pine	-	-	Tree (TG)																																		
Polyscias elegans	Celery Wood	-	-	Tree (TG)									0.1	7	0.5	1			3	10	3	5			2	10			0	1	0.1	2			0.2	15	0.1	10
Polyscias murrayi	Pencil Cedar	-	-	Tree (TG)																																		
Pomax umbellata	-	-	-	Forb (F)																																		
Pothos longipes	-	-	-	Forb (F)																																		
Pratia purpurascens	Whiteroot	-	-	Forb (F)							0.1	25	0.1	1													0.1	20	0.1	50	0.1	20	0.1	30			0.1	30
Pseuderanthemum variabile	Pastel Flower	-	-	Forb (F)	0.1	200	0.1	50					0.1	50			0.1	10	0.5	50	0.1	75	0.1	100	0.1	50			0.1	10	0.1	200	0.1	1	0.1	100	0.1	50
Psychotria loniceroides	Hairy Psychotria	-	-	Shrub (SG)															0.1	1																		
Psydrax odorata	Shiny-leaved Canthium	-	-	Shrub (SG)																																		
Pteridium esculentum	Bracken	-	-	Fern (EG)	3	30	3	30			0.1	10	5		0.5	10	0.5	10	0.5	10					0.1	2			0.2	2			2	20			0.5	10
Pyrrosia confluens var. confluens	Horseshoe Felt Fern	-	-	Fern (EG)																																		
Pyrrosia rupestris	Rock Felt Fern	-	-	Fern (EG)																																		
Quintinia verdonii	Grey Possumwood	-	-	Tree (TG)																																		
Rhodamnia rubescens	Scrub Turpentine	-	-	Shrub (SG)									2	5	2	3	1	1	0.5	1	5																0.5	1
Rhodosphaera rhodanthema	Deep Yellowwood	-	-	Tree (TG)																																		
Ricinus communis	Castor Oil Plant	Yes	Yes	-																																		
Ripogonum album	White Supplejack	-	-	Other (OG)																																		
Ripogonum discolor	Prickly Supplejack	-	-	Other (OG)																																		
Rivina humilis	Pigeonberry	Yes	-	-																																		
Rubus moluccanus var. moluccanus	Molucca Raspberry	-	-	Shrub (SG)																							0.2	2									0.1	10
Rubus parvifolius	Native Raspberry	-	-	Shrub (SG)																																		
Rubus rosifolius	Rose-leaf Bramble	-	-	Shrub (SG)																																		
Sarcopteryx stipata	Steelwood	-	-	Tree (TG)																																		
Scolopia braunii	Flintwood	-	-	Tree (TG)																																		
Senecio madagascariensis	Fireweed	Yes	Yes	-																																		
Senna acclinis	Rainforest Sennna	-	-	Shrub (SG)																																		
Senna pendula var. glabrata	Easter Cassia	Yes	Yes	-																							1	20										

Species	Common Name	Exotic	High Threat Exotic	Growth Form Group	T18		T19		T20		T21		T22		T23		T24		T25		T26		T27		T28		T29		T30		T31		T32		T33		T34	
					C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A
Senna septemtrionalis	Smooth Senna	Yes	-	-													0.1	1																				
Setaria sphacelata	South African Pigeon Grass	Yes	-	-																																		
Setaria verticillata	Hooked Bristlegrass	Yes	-	-																																		
Schoenoplectus validus	River Club Rush	-	-	Grass& Grass-like (GG)																																		
Sloanea australis	Maiden's Bush	-	-	Tree (TG)																																		
Smilax australis	Barbed Wire Vine	-	-	Other (OG)	2	50	0.1	10	0.1	2	0.1	1	0.5	10	0.5	20	0.1	1	8		0.5	10			0.1	20			0.2	3	0.1	1	0.2	10	7		0.1	6
Smilax glyciphylla	Sweet Sarsaparilla	-	-	Other (OG)																							0.1	1										
Solanum aviculare	Kangaroo Apple	-	-	Shrub (SG)																																		
Solanum capsicoides	Devil's Applie	Yes	-	-																																		
Solanum hapalum	Hairy Solanum	-	-	Shrub (SG)															0.1	1			0.5	10	0.1	1									0.1	1		
Solanum mauritianum	Wild Tobacco	Yes	-	-																																		
Solanum seaforthianum	Climbing Nightshade	Yes	Yes	-																																		
Solanum stelligrum	Devil's Needles	-	-	Forb (F)																									0.1	1							0.1	10
Stephania japonica	Tape Vine	-	-	Other (OG)																			0.1	20			0	20							0.1	1		
Syncarpia glomulifera	Turpentine	-	-	Tree (TG)									15		2	1	10		30		1	1	3	10	25		2	1	0.5	2	10		5		6		2	2
Synoum glandulosum subsp. glandulosum	Scentless Rosewood	-	-	Shrub (SG)	0.1	3	1	2							0.5	1	1	5	0.2	3	1	6			0.1	2			0.1	2					0.2	2		
Syzygium australe	Brush Cherry	-	-	Shrub (SG)																																		
Syzygium francisii	Giant Water Gum	-	-	Tree (TG)																																		
Syzygium moorei	Durroby	-	-	Tree (TG)																																		
Syzygium luehmannii	Riberry	-	-	Tree (TG)																																		
Syzygium oleosum	Blue Lilly Pilly	-	-	Shrub (SG)																			1	2														
Tabernaemontana pandacaqui	Banana Bush	-	-	Shrub (SG)																																		
Tasmannia insipida	Brush Pepperbush	-	-	Shrub (SG)																																		
Tephrosia glomeruliflora	Pink Tephrosia	Yes	-	-																																		
Themeda triandra	Kangaroo Grass	-	-	Grass& Grass-																							1	40										

Species	Common Name	Exotic	High Threat Exotic	Growth Form Group	T18		T19		T20		T21		T22		T23		T24		T25		T26		T27		T28		T29		T30		T31		T32		T33		T34	
					C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A
				like (GG)																																		
Toona ciliata	Red Cedar	-	-	Tree (TG)															0.5	2					1	2							0.1	1	2	10	0.5	6
Trema tomentosa var. aspera	Native Peach	-	-	Shrub (SG)																							0.5	2										
Tripladenia cunninghamii	Bush Lily	-	-	Tree (TG)					0.1	3																												
Tristaniopsis laurina	Water Gum	-	-	Tree (TG)																																		
Trochocarpa laurina	Tree Heath	-	-	Tree (TG)					3	10			6				1	2			0.5	4									7							
Trophis scandens	Burny Vine	-	-	Other (OG)					0.1	1																												
Typha spp.	-	-	-	Grass& Grass-like (GG)																																		
Urtica incisa	Scrub Nettle	-	-	Forb (F)																																		
Verbena bonariensis	Purpletop	Yes	-	-																																		
Verbena rigida	Slender Vervain	Yes		-							0.5	100																										
Veronica plebeia	Speedwell	-	-	Forb (F)																																		
Wikstroemia indica	Bootlace Bush	-	-	Shrub (SG)											0.1	1	0.1	1	0.5	1																		
Wilkiea huegeliana	Veiny Wilkiea	-	-	Shrub (SG)											2	3	1	6					0.5	1					0.5	1								
Xanthorrhoea spp.	Grass Tree	-	-	Other (OG)																																		
Xanthostemon chrysanthus	Golden Penda	-	-	-																																		
Zieria smithii	Sandfly Zieria	-	-	Shrub (SG)					1	20			1	50	0.1	6	0.1	1											1	30	1	30					0.1	3

Species	Common Name	Exotic	High Threat Exotic	Growth Form Group	T35		T36		T37		T38		T39		T40	
					C	A	C	A	C	A	C	A	C	A	C	A
Acacia falcata	Sickle Wattle	-	-	Shrub (SG)												
Acacia binervata	Two-veined Hickory	-	-	Tree (TG)												
Acacia irrorata	Green Wattle	-	-	Shrub (SG)												
Acacia maidenii	Maiden's Wattle	-	-	Tree (TG)												
Acacia melanoxylon	Blackwood	-	-	Tree (TG)	0.1	1	2	4	1	2	0.5	6	1	3		
Acacia spp.	Wattle	-	-	Shrub (SG)												

Species	Common Name	Exotic	High Threat Exotic	Growth Form Group	T35		T36		T37		T38		T39		T40	
					C	A	C	A	C	A	C	A	C	A	C	A
Acmena smithii	Lilly Pilly	-	-	Tree (TG)												
Acronychia laevis	Hard Aspen	-	-	Tree (TG)												
Acronychia oblongifolia	White Aspen	-	-	Shrub (SG)												
Acronychia pubescens	Hairy Pubescens	-	-	Shrub (SG)												
Acronychia suberosa	Corky Acronychia	-	-	Tree (TG)												
Acronychia spp.	-	-	-	Shrub (SG)												
Adiantum aethiopicum	Common Maidenhair	-	-	Fern (EG)			**0.1**	**2**			**0.1**	**2**	**0.5**	**50**	**0.1**	**10**
Adiantum hispidulum	Rough Maidenhair	-	-	Fern (EG)							**0.1**	**10**				
Adiantum silvaticum	-	-	-	Fern (EG)												
Ageratina adenophora	Crofton Weed	Yes	Yes	-												
Ageratina riparia	Mistflower	Yes	Yes	-					**0.2**	**10**					**5**	
Ageratum houstonianum	Blue Billygoat Weed	Yes	-	-												
Akania bidwillii	Turnipwood	-	-	Tree (TG)												
Alchornea ilicifolia	Native Holly	-	-	Shrub (SG)												
Alectryon subcinereus	Wild Quince	-	-	Shrub (SG)												
Allocasuarina torulosa	Forest She-oak	-	-	Tree (TG)	**0.1**	**1**	**4**	**8**	**1**	**2**						
Alocasia brisbanensis	Cunjevoi	-	-	Forb (F)												
Alphitonia petriei	White Ash	-	-	Tree (TG)												
Alphitonia excelsa	Red Ash	-	-	Tree (TG)			**0.5**	**3**	**0.2**	**4**			**0.2**	**4**	**0.1**	**1**
Alpinia caerulea	Native Ginger	-	-	Forb (F)												
Alyxia ruscifolia	Prickly Alyxia	-	-	Shrub (SG)												
Andropogon virginicus	Whiskey Grass	Yes	Yes	-												
Aneilema acuminatum	-	-	-	Forb (F)												
Araucaria cunninghamii	Hoop Pine	-	-	Tree (TG)	**0.1**	**1**	**0.1**	**1**			**0.5**	**2**			**0.1**	**1**
Araucaria bidwilli	Bunya Pine	-	-	Tree (TG)												
Archidendron grandiflorum	Pink Lace Flower	-	-	Tree (TG)												
Archidendron mullerianum	Veiny Lace Flower	-	-	Tree (TG)												

Species	Common Name	Exotic	High Threat Exotic	Growth Form Group	T35		T36		T37		T38		T39		T40	
					C	A	C	A	C	A	C	A	C	A	C	A
Archontophoenix cunninghamiana	Bangalow Palm	-	-	Other (OG)												
Archirhodomyrtus beckleri	Rose Myrtle	-	-	Shrub (SG)	**3**		**0.2**	**2**							**0.2**	**3**
Ardisia crenata	Coral Berry	Yes	-	-											**0.1**	**1**
Arthropteris tenella	Climbing Fern	-	-	Fern (EG)												
Asparagus spp.	-	Yes	Yes	-												
Asplenium australasicum	Bird's Nest Fern	-	-	Fern (EG)												
Astrotricha latifolia	-	-	-	Shrub (SG)												
Atalaya salicifolia	Brush Whitewood	-	-	Tree (TG)												
Atractocarpus benthamianus	Native Gardenia	-	-	Shrub (SG)												
Auranticarpa rhombifolia	Diamond Leaf Pittosporum	-	-	Tree (TG)												
Austromyrtus dulcis	Midgen Berry	-	-	Shrub (SG)												
Austrosteenisia blackii var. blackii	Blood Vine	-	-	Other (OG)												
Austrosteenisia glabristyla	Giant Blood Vine	-	-	Other (OG)												
Baccharis halimifolia	Groundsel	Yes	Yes	-												
Backhousia myrtifolia	Grey Myrtle	-	-	Shrub (SG)												
Baloghia inophylla	Brush Bloodwood	-	-	Tree (TG)												
Baumea articulata	Jointed Rush	-	-	Grass& Grass-like (GG)												
Baumea rubiginosa	Soft Twig Rush	-	-	Grass& Grass-like (GG)												
Beilschmiedia obtusifolia	Blush Walnut	-	-	Tree (TG)												
Bidens pilosa	Cobbler's Pegs	Yes	Yes	-												
Blechnum cartilagineum	Gristle Fern	-	-	Fern (EG)	**2**		**2**	**50**			**0.1**	**10**				
Bosistoa pentacocca var. pentacocca	Ferny-leaved Bosistoa	-	-	Tree (TG)												
Brachychiton acerifolius	Illawarra Flame Tree	-	-	Tree (TG)									**1**	**1**		
Breynia oblongifolia	Coffee Bush	-	-	Shrub (SG)			**0.1**	**1**	**0.5**	**10**	**2**	**50**	**3**	**30**	**1**	**20**
Buddleja davidii	Butterfly Bush	Yes	-	-												

Species	Common Name	Exotic	High Threat Exotic	Growth Form Group	T35		T36		T37		T38		T39		T40	
					C	A	C	A	C	A	C	A	C	A	C	A
Bursaria spinosa	Black Thorn	-	-	Shrub (SG)												
Caesalpinia subtropica	Corky Prickly-vine	-	-	Other (OG)									**0.1**	**1**		
Calamus muelleri	Lawyer Vine	-	-	Other (OG)												
Calanthe triplicata	Christmas Orchid	-	-	Forb (F)												
Callistemon salignus	Willow Bottlebrush	-	-	Shrub (SG)	**6**		**5**				**3**	**6**				
Callistemon viminalis	Weeping Bottlebrush	-	-	Tree (TG)												
Callitris columenllaris	Cypress Pine	-	-	Tree (TG)												
Cannabis spp.	Cannabis	Yes	-	-												
Carissa ovata	Conkerberry	-	-	Other (OG)												
Cassytha glabella	Dodder Laurel	-	-	Other (OG)												
Castanospermum australe	Black Bean	-	-	Tree (TG)												
Celastrus subspicata	Large-leaved Staff Vine	-	-	Other (OG)												
Caldcluvia paniculosa	Soft Corkwood	-	-	Tree (TG)												
Callerya megasperma	Native Wistaria	-	-	Other (OG)												
Callicarpa pedunculata	Velvet Leaf	-	-	Shrub (SG)												
Calochlaena dubia	Rainbow Fern	-	-	Other (OG)												
Carex appressa	Tall Sedge	-	-	Grass& Grass-like (GG)												
Carex gaudichaudiana	-	-	-	Grass& Grass-like (GG)												
Carex longebrachiata	Sedge	-	-	Grass& Grass-like (GG)												
Castanospora alphandii	Brown Tamarind	-	-	Tree (TG)												
Cayratia clematidea	Native Grape	-	-	Other (OG)			**0.1**	**1**								
Centella asiatica	Pennywort	-	-	Forb (F)	**0.1**	**10**	**0.1**	**10**								
Cheilanthes sieberi	Rock Fern	-	-	Fern (EG)												
Chloris gayana	Rhodes Grass	Yes	Yes	-												
Christella dentata	Binung	-	-	Fern (EG)												

Species	Common Name	Exotic	High Threat Exotic	Growth Form Group	T35		T36		T37		T38		T39		T40	
					C	A	C	A	C	A	C	A	C	A	C	A
Cinnamomum camphora	Camphor Laurel	Yes	Yes	-							**0.1**	**3**				
Cinnamomum oliveri	Oliver's Sassafras	-	-	Tree (TG)												
Cinnamomum virens	Red-barked Sassafras	-	-	Tree (TG)												
Cissus antarctica	Kangaroo Vine	-	-	Other (OG)	**0.1**	**4**	**0.2**	**20**	**0.1**	**1**	**0.1**	**1**	**0.5**	**10**		
Cissus hypoglauca	Water Vine	-	-	Other (OG)	**0.2**	**10**					**0.1**	**3**			**0.5**	**2**
Cissus sterculiifolia	Yaroong	-	-	Other (OG)												
Citharexylum spinosum	Fiddlewood	Yes	-	-												
Claoxylon australe	Brittlewood	-	-	Shrub (SG)												
Clematis aristata	Australian Clematis	-	-	Other (OG)												
Clerodendrum floribundum var. floribundum	-	-	-	Shrub (SG)												
Clerodendrum tomentosum	Hairy Clerodendron	-	-	Tree (TG)												
Commelina cyanea	Native Wandering Jew	-	-	Forb (F)												
Commelina diffusa	Snake Vine	-	-	Forb (F)												
Commersonia bartramia	Brown Kurrajong	-	-	Tree (TG)												
Conyza bonariensis	Flaxleaf Fleabane	Yes	-	-												
Cordyline petiolaris	Broad-leaved Palm Lily	-	-	Other (OG)			**0.2**	**1**								
Cordyline rubra	Palm-lily	-	-	Other (OG)												
Corymbia intermedia	Pink Bloodwood	-	-	Tree (TG)	**10**		**6**		**2**	**1**					**13**	
Corymbia citriodora	Spotted Gum	-	-	Tree (TG)												
Corymbia torelliana	Cadaghi	Yes	Yes	-												
Crassocephalum crepidioides	Thickhead	Yes	-	-												
Crotalaria spp.	Rattlepod	Yes	-	-												
Croton verreauxii	Green Native Cascarilla	-	-	Shrub (SG)												
Cryptocarya bidwillii	Yellow Laurel	-	-	Tree (TG)												
Cryptocarya erythroxylon	Pigeonberry Ash	-	-	Tree (TG)												
Cryptocarya glaucescens	Jackwood	-	-	Tree (TG)			**0.1**	**1**								

Species	Common Name	Exotic	High Threat Exotic	Growth Form Group	T35		T36		T37		T38		T39		T40	
					C	A	C	A	C	A	C	A	C	A	C	A
Cryptocarya microneura	Murrogun	-	-	Tree (TG)												
Cryptocarya obovata	Pepperberry	-	-	Tree (TG)												
Cryptocarya rigida	Forest Maple	-	-	Shrub (SG)	**0.5**	**20**	**0.5**	**3**								
Cryptocarya triplinervis	Three-veined Cryptocarya	-	-	Tree (TG)												
Cyathea cooperi	Straw Treefern	-	-	Other (OG)												
Cyclophyllum longipetalum	Coast Canthium	-	-	Tree (TG)												
Cymbopogon refractus	Barbed Wire Grass	-	-	Grass& Grass-like (GG)									**0.1**	**1**		
Cynodon dactylon	Couch	-	-	Grass& Grass-like (GG)												
Cyperus gracilis	Slender Flat-sedge	-	-	Grass& Grass-like (GG)												
Cyperus sp.	-	-	-	Grass& Grass-like (GG)									**0.1**	**10**	**0.1**	**30**
Cyperus tetraphyllus	-	-	-	Grass& Grass-like (GG)												
Cupaniopsis anacardioides	Tuckeroo	-	-	Tree (TG)												
Cupaniopsis newmanii	Long-leaved Tuckeroo	-	-	Shrub (SG)												
Cupaniopsis parvifolia	Small-leaved Tuckeroo	-	-	Tree (TG)	**0.1**	**1**					**0.2**	**2**	**0.5**	**3**	**0.2**	**3**
Cuttsia viburnea	Elderberry	-	-	Shrub (SG)												
Cuphea carthagensis	Columbian Waxweed	Yes	-	-												
Daucus carota	Carrot Weed	Yes	-	-												
Davallia solida var. pyxidata	Hare's Foot Fern	-	-	Fern (EG)												
Daviesia arborea	Golden Pea Tree	-	-	Shrub (SG)												
Dawsonia superba var. pulchra	Giant Moss	-	-	Other (OG)												
Dendrobium spp.	-	-	-	Other (OG)												
Denhamia bilocularis	Orangebark	-	-	Shrub (SG)												
Denhamia celastroides	Denhamia	-	-	Shrub (SG)												

Species	Common Name	Exotic	High Threat Exotic	Growth Form Group	T35		T36		T37		T38		T39		T40	
					C	A	C	A	C	A	C	A	C	A	C	A
Denhamia silvestris	Narrow-leaved Orangebark	-	-	Shrub (SG)			**0.1**	**1**								
Desmodium rhytidophyllum	Hairy Trefoil	-	-	Forb (F)					**0.1**	**1**						
Desmodium gunnii	-	-	-	Forb (F)			**0.1**	**3**			**0.1**	**20**				
Desmodium varians	Slender Tick-trefoil	-	-	Other (OG)												
Derris involuta	Native Derris	-	-	Other (OG)												
Dianella caerulea	Blue Flax-lily	-	-	Forb (F)												
Dianella revoluta	Blueberry Lily	-	-	Forb (F)												
Dioscorea transversa	Native Yam	-	-	Other (OG)	**0.2**	**50**	**0.1**	**10**					**0.1**	**20**		
Diospyros australis	Black Plum	-	-	Shrub (SG)												
Diospyros pentamera	Myrtle Ebony	-	-	Tree (TG)												
Diploglottis australis	Native Tamarind	-	-	Tree (TG)												
Diploglottis campbellii	Small-leaved Tamarind	-	-	Tree (TG)												
Dipodium variegatum	Blotched Hyacith-orchid	-	-	Forb (F)												
Dodonaea spp.	Hop-Bush	-	-	Shrub (SG)												
Dolichandra unguis-cati	Cat's Claw Creeper	Yes	Yes	-												
Doodia aspera	Prickly Rasp Fern	-	-	Fern (EG)			**0.2**	**20**			**0.5**	**20**	**0.2**	**10**		
Drypetes deplanchei	Yellow Tulipwood	-	-	Tree (TG)												
Duboisia myoporoides	Corkwood	-	-	Shrub (SG)												
Dysoxylum fraserianum	Rosewood	-	-	Tree (TG)												
Dysoxylum mollissimum subsp. molle	Red Bean	-	-	Tree (TG)												
Dysoxylum rufum	Hairy Rosewood	-	-	Tree (TG)												
Echinostephia aculeata	Prickly Tape Vine	-	-	Other (OG)												
Endiandra discolor	Rose Walnut	-	-	Tree (TG)												
Endiandra muelleri subsp. bracteata	Green-leaved Rose Walnut	-	-	Tree (TG)												
Endiandra pubens	Hairy Walnut	-	-	Tree (TG)												

Species	Common Name	Exotic	High Threat Exotic	Growth Form Group	T35		T36		T37		T38		T39		T40	
					C	A	C	A	C	A	C	A	C	A	C	A
Elaeocarpus obovatus	Hard Quandong	-	-	Tree (TG)												
Elaeocarpus reticulatus	Blueberry Ash	-	-	Shrub (SG)												
Elattostachys nervosa	Beetroot Tree	-	-	Tree (TG)												
Eleusine indica	Indian Goosegrass	Yes	-	-												
Embelia australiana	-	-	-	Other (OG)	**0.1**	**1**	**0.1**	**1**								
Emilia sonchifolia	Tasselflower	Yes	-	-												
Entolasia stricta	Wiry Panic	-	-	Grass& Grass-like (GG)									**0.1**	**1**		
Eragrostis curvula	African Lovegass	Yes	Yes	-												
Erythrina verspertilio	Bat-wing Coral Tree	-	-	Tree (TG)												
Eucalyptus acmenoides	White Mahogany	-	-	Tree (TG)												
Eucalyptus carnea	Broad-leaved Mahogany	-	-	Tree (TG)												
Eucalyptus crebra	Narrow-leaved Ironbark	-	-	Tree (TG)												
Eucalyptus grandis	Flooded Gum	-	-	Tree (TG)	**4**	**3**			**40**							
Eucalyptus microcorys	Tallowwood	-	-	Tree (TG)					**8**		**5**					
Eucalyptus moluccana	Gum-topped Box	-	-	Tree (TG)												
Eucalyptus propinqua	Grey Gum	-	-	Tree (TG)												
Eucalyptus pilularis	Blackbutt	-	-	Tree (TG)												
Eucalyptus resinifera	Red Mahogany	-	-	Tree (TG)												
Eucalyptus robusta	Swamp Mahogany	-	-	Tree (TG)												
Eucalyptus saligna	Sydney Blue Gum	-	-	Tree (TG)												
Eucalyptus siderophloia	Northern Grey Ironbark	-	-	Tree (TG)	**10**		**10**									
Eucalyptus tereticornis	Forest Red Gum	-	-	Tree (TG)												
Euphorbia spp.	Spurges	-	-	Forb (F)												
Eupomatia laurina	Bolwarra	-	-	Shrub (SG)	**0.5**	**2**										
Euroschinus falcatus var. falcatus	Ribbonwood	-	-	Tree (TG)					**0.5**	**1**						

Species	Common Name	Exotic	High Threat Exotic	Growth Form Group	T35		T36		T37		T38		T39		T40	
					C	A	C	A	C	A	C	A	C	A	C	A
Eustrephus latifolius	Wombat Berry	-	-	Other (OG)			**0.1**	**5**			**0.1**	**10**	**0.1**	**20**	**0.1**	**10**
Flagellaria indica	Whip Vine	-	-	Other (OG)												
Gahnia aspera	Rough Saw-sedge	-	-	Grass& Grass-like (GG)											**0.5**	**20**
Gahnia sieberiana	Red-fruit Saw-sedge	-	-	Grass& Grass-like (GG)	**0.2**	**5**	**0.2**	**10**					**0.5**	**20**		
Geitonoplesium cymosum	Scrambling Lily	-	-	Other (OG)												
Geissois benthamiana	Red Carabeen	-	-	Tree (TG)												
Geranium homeanum	Cranesbill	-	-	Forb (F)							**0.1**	**2**				
Glochidion ferdinandi	Cheese Tree	-	-	Tree (TG)					**1**	**3**	**1**	**4**			**0.5**	**4**
Glochidion sumatranum	Umbrella Cheese Tree	-	-	Tree (TG)												
Glycine clandestina	Twining Glycine	-	-	Other (OG)							**0.1**	**1**	**0.1**	**20**		
Glycine microphylla	Small-leaf Glycine	-	-	Other (OG)												
Gmelina leichhardtii	White Beech	-	-	Tree (TG)												
Gomphocarpus physocarpus	Balloon Cotton Bush	Yes	-	-												
Gossia bidwillii	Python Tree	-	-	Tree (TG)							**1**	**1**				
Gossia hillii	Scaly Myrtle	-	-	Shrub (SG)												
Grevillea robusta	Silky Oak	-	-	Tree (TG)											**0.1**	**3**
Guioa semiglauca	Guioa	-	-	Tree (TG)	**5**		**6**		**2**	**3**	**1**	**1**			**2**	**4**
Gymnostachys anceps	Settler's Flax	-	-	Forb (F)												
Ficus coronata	Creek Sandpaper Fig	-	-	Shrub (SG)												
Ficus fraseri	Sandpaper Fig	-	-	Tree (TG)												
Ficus macrophylla	Moreton Bay Fig	-	-	Tree (TG)												
Ficus obliqua	Small-leaved Fig	-	-	Tree (TG)												
Ficus spp.	-	-	-	Tree (TG)												
Ficus watkinsiana	Strangling Fig	-	-	Tree (TG)												
Flindersia australis	Teak	-	-	Tree (TG)												

Species	Common Name	Exotic	High Threat Exotic	Growth Form Group	T35		T36		T37		T38		T39		T40	
					C	A	C	A	C	A	C	A	C	A	C	A
Flindersia bennettiana	Bennett's Ash	-	-	Tree (TG)												
Flindersia schottiana	Bumpy Ash	-	-	Tree (TG)												
Flindersia spp.	-	-	-	Tree (TG)												
Hardenbergia violacea	False Sarsaparilla	-	-	Other (OG)												
Helicia ferruginea	Rusty Oak	-	-	Shrub (SG)												
Hibbertia scandens	Snake Vine	-	-	Other (OG)							**0.1**	**1**				
Hibiscus heterophyllus	Native Rosella	-	-	Shrub (SG)											**0.5**	**3**
Hibiscus spendens	Splendid Hibiscus	-	-	Shrub (SG)												
Hovea acutifolia	Purple Pea Bush	-	-	Shrub (SG)							**0.5**	**2**				
Hymenosporum flavum	Native Frangipani	-	-	Shrub (SG)												
Hypolepis muelleri	Harsh Ground Fern	-	-	Fern (EG)												
Imperata cylindrica	Blady Grass	-	-	Grass& Grass-like (GG)					**1**	**20**	**3**	**50**	**3**	**100**		
Jagera pseudorhus var. pseudorhus	Foambark Tree	-	-	Tree (TG)	**0.5**	**10**	**0.1**	**2**			**0.5**	**20**			**0.5**	**6**
Kennedia rubicunda	Dusky Coral Pea	-	-	Other (OG)							**0.1**	**1**				
Lantana camara	Lantana	Yes	Yes	-	**2**	**20**	**2**	**20**	**75**		**8**		**40**		**60**	
Lastreopsis marginans	Bordered Shield Fern	-	-	Fern (EG)												
Legnephora moorei	Round-leaf Vine	-	-	Other (OG)												
Lepidosperma laterale	Variable Sword Sedge	-	-	Grass& Grass-like (GG)												
Leucopogon juniperinus	Prickly beard-heath	-	-	Shrub (SG)					**0.2**	**5**	**1**	**10**	**0.5**	**10**	**0.1**	**6**
Ligustrum lucidum	Large-leaved Privet	Yes	Yes	-												
Ligustrum sinense	Small-leaved Privet	Yes	Yes	-									**1**	**10**		
Linospadix monostachyos	Walking-stick Palm	-	-	Other (OG)												
Litsea australis	Brown Bolly Gum	-	-	Tree (TG)												
Litsea reticulata	Bolly Gum	-	-	Tree (TG)												
Livistona australis	Cabbage-tree Palm	-	-	Other (OG)												

Species	Common Name	Exotic	High Threat Exotic	Growth Form Group	T35		T36		T37		T38		T39		T40	
					C	A	C	A	C	A	C	A	C	A	C	A
Lomandra confertifolia	Mat-rush	-	-	Grass& Grass-like (GG)												
Lomandra filiformis	Wattle Mat-rush	-	-	Grass& Grass-like (GG)	**0.1**	**4**										
Lomandra hystrix	Creek Mat-rush	-	-	Grass& Grass-like (GG)												
Lomandra longifolia	Spiny-head Mat-rush	-	-	Grass& Grass-like (GG)	**0.1**	**2**	**0.1**	**4**			**2**	**30**			**0.1**	**2**
Lomandra spp.	-	-	-	Grass& Grass-like (GG)												
Lomatia arborescens	Tree Lomatia	-	-	Shrub (SG)												
Lophostemon confertus	Brush Box	-	-	Tree (TG)	**50**		**40**		**1**	**1**	**40**		**70**		**40**	
Lophostemon suaveolens	Swamp Box	-	-	Tree (TG)												
Macaranga tanarius	Macaranga	-	-	Tree (TG)												
Maclura cochinchinensis	Cockspur Thorn	-	-	Other (OG)	**0.5**	**5**	**1**	**15**	**0.1**	**2**	**0.1**	**3**	**1**	**20**	**0.1**	**5**
Macroptilium atropurpureum	Siratro	Yes	-	-												
Mallotus philippensis	Red Kamala	-	-	Tree (TG)	**0.1**	**2**	**1**	**6**			**0.1**	**1**	**1**	**10**	**1**	**10**
Marsdenia rostrata	Milk Vine	-	-	Other (OG)												
Megathyrsus maximus	Guinea Grass	Yes	Yes	-												
Meiogyne stenopetala subsp. stenopetala	-	-	-	Shrub (SG)												
Melaleuca linarifolia	Snow-in-summer	-	-	Shrub (SG)												
Melaleuca styphelioides	Prickly Paperbark	-	-	Shrub (SG)												
Melia azedarach	White Cedar	-	-	Tree (TG)												
Melicope hayesii	Small-leaved Doughwood	-	-	Shrub (SG)												
Melicope micrococca	White Euodia	-	-	Shrub (SG)												
Melodinus australis	Southern Melodinus	-	-	Other (OG)												
Melodinus acutiflorus	Bellbird Vine	-	-	Other (OG)												

Species	Common Name	Exotic	High Threat Exotic	Growth Form Group	T35		T36		T37		T38		T39		T40	
					C	A	C	A	C	A	C	A	C	A	C	A
Mischocarpus australis	Red Pear Fruit	-	-	Tree (TG)												
Morinda jasminoides	Sweet Morinda	-	-	Other (OG)	**0.1**	**20**									**0.1**	**1**
Murraya paniculata	Mock Orange	Yes		-												
Musa sp.	Banana	Yes	-	-												
Myrsine howittiana	Muttonwood	-	-	Shrub (SG)												
Myrsine variabilis	Variable Muttonwood	-	-	Shrub (SG)			**0.1**	**1**			**0.1**	**1**			**0.1**	**2**
Neolitsea australiensis	Grey Bolly Gum	-	-	Tree (TG)												
Neolitsea dealbata	Hairy-leaved Bolly Gum	-	-	Tree (TG)							**0.2**	**4**				
Notelaea johnsonii	Veinless Mock Olive	-	-	Shrub (SG)												
Notelaea longifolia	Large Mock-olive	-	-	Tree (TG)												
Nymphoides indica	Water Snowflake	-	-	Forb (F)												
Olea paniculata	Native Olive	-	-	Tree (TG)												
Onopordum acanthium	Scotch Thistle	Yes	-	-												
Oplismenus aemulus	Basket Grass	-	-	Grass& Grass-like (GG)							**0.1**	**10**	**0.1**	**50**		
Oplismenus imbecillis	-	-	-	Grass& Grass-like (GG)												
Oplismenus hirtellus	Wavyleaf Basketgrass	-	-	Grass& Grass-like (GG)												
Orites excelsus	Prickly Ash	-	-	Tree (TG)												
Ottochloa gracillima	Graceful Grass	-	-	Grass& Grass-like (GG)	**0.1**	**100**	**0.1**	**20**	**0.1**	**50**	**2**	**1000**	**2**	**1000**	**2**	**1000**
Oxalis chnoodes	Wood Sorrel	-	-	Forb (F)			**0.1**	**10**					**0.1**	**2**		
Oxalis corniculata	Creeping Oxalis	Yes	-	-												
Ozothamnus diosmifolius	White Dogwood	-	-	Shrub (SG)												
Palmeria foremanii	Big Scrub Anchor Vine	-	-	Other (OG)												
Palmeria scandens	Anchor Vine	-	-	Other (OG)												
Pandorea jasminoides	Bower Vine	-	-	Other (OG)												

Species	Common Name	Exotic	High Threat Exotic	Growth Form Group	T35		T36		T37		T38		T39		T40	
					C	A	C	A	C	A	C	A	C	A	C	A
Pandorea pandorana	Wonga Wonga Vine	-	-	Other (OG)												
Panicum pygmaeum	Pygmy Panic	-	-	Grass& Grass-like (GG)												
Parsonsia straminea	Monkey Rope	-	-	Other (OG)												
Paspalum dilatatum	Dallas Grass	Yes	Yes	-												
Paspalum mandiocanum	Broad-leaved Paspalum	Yes	-	-									**1**	**20**	**0.5**	**20**
Paspalum spp.	-	Yes	-	-												
Paspalum urvillei	Vasey's Grass	Yes	-	-												
Passiflora edulis	Common Passionfruit	Yes	-	-												
Passiflora suberosa	Corky Passionflower	Yes	Yes	-												
Passiflora subpeltata	White Passionflower	Yes	-	-			**0.1**	**1**								
Pennisetum clandestinum	Kikuyu	Yes	-	-												
Pentaceras australe	Bastard's Crow Ash	-	-	Tree (TG)												
Persoonia adenantha	Geebung	-	-	Shrub (SG)					**0.5**	**2**	**1**	**2**				
Philydrum lanuginosum	Wooly Frogmouth	-	-	Forb (F)												
Phytolacca octandra	Inkweed	Yes	-	-												
Pilidiostigma glabrum	Plum Myrtle	-	-	Shrub (SG)												
Pimelea latifolia	Rice Flower	-	-	Shrub (SG)												
Pinus elliottii	Slash Pine	Yes	Yes	-												
Pittosporum multiflorum	Orange Thorn	-	-	Shrub (SG)												
Pittosporum undulatum	Sweet Pittosporum	-	-	Shrub (SG)											**0.5**	**4**
Planchonella australis	Black Apple	-	-	Tree (TG)												
Platycerium bifurcatum	Elkhorn Fern	-	-	Fern (EG)												
Platycerium superbum	Staghorn	-	-	Fern (EG)			**0.1**	**1**	**0.1**	**1**						
Poa labillardierei	Common Tussock-grass	-	-	Grass& Grass-like (GG)												
Podocarpus elatus	Plum Pine	-	-	Tree (TG)												
Polyscias elegans	Celery Wood	-	-	Tree (TG)												

Species	Common Name	Exotic	High Threat Exotic	Growth Form Group	T35		T36		T37		T38		T39		T40	
					C	A	C	A	C	A	C	A	C	A	C	A
Polyscias murrayi	Pencil Cedar	-	-	Tree (TG)												
Pomax umbellata	-	-	-	Forb (F)												
Pothos longipes	-	-	-	Forb (F)												
Pratia purpurascens	Whiteroot	-	-	Forb (F)	**0.1**	**100**	**0.1**	**100**			**0.2**	**200**	**0.1**	**200**	**0.1**	**200**
Pseuderanthemum variabile	Pastel Flower	-	-	Forb (F)	**0.1**	**200**	**0.1**	**50**	**0.1**	**20**			**0.1**	**100**		
Psychotria loniceroides	Hairy Psychotria	-	-	Shrub (SG)												
Psydrax odorata	Shiny-leaved Canthium	-	-	Shrub (SG)												
Pteridium esculentum	Bracken	-	-	Fern (EG)	**1**	**20**	**0.1**	**3**	**1**	**20**	**0.1**	**3**				
Pyrrosia confluens var. confluens	Horseshoe Felt Fern	-	-	Fern (EG)												
Pyrrosia rupestris	Rock Felt Fern	-	-	Fern (EG)												
Quintinia verdonii	Grey Possumwood	-	-	Tree (TG)												
Rhodamnia rubescens	Scrub Turpentine	-	-	Shrub (SG)	**0.5**	**2**										
Rhodosphaera rhodanthema	Deep Yellowwood	-	-	Tree (TG)												
Ricinus communis	Castor Oil Plant	Yes	Yes	-												
Ripogonum album	White Supplejack	-	-	Other (OG)												
Ripogonum discolor	Prickly Supplejack	-	-	Other (OG)												
Rivina humilis	Pigeonberry	Yes	-	-												
Rubus moluccanus var. moluccanus	Molucca Raspberry	-	-	Shrub (SG)			**0.1**	**1**								
Rubus parvifolius	Native Raspberry	-	-	Shrub (SG)												
Rubus rosifolius	Rose-leaf Bramble	-	-	Shrub (SG)												
Sarcopteryx stipata	Steelwood	-	-	Tree (TG)												
Scolopia braunii	Flintwood	-	-	Tree (TG)											**0.1**	**1**
Senecio madagascariensis	Fireweed	Yes	Yes	-												
Senna acclinis	Rainforest Sennna	-	-	Shrub (SG)												
Senna pendula var. glabrata	Easter Cassia	Yes	Yes	-	**0.1**	**1**					**0.1**	**2**	**6**		**2**	**20**
Senna septemtrionalis	Smooth Senna	Yes	-	-												
Setaria sphacelata	South African Pigeon Grass	Yes	-	-												

Species	Common Name	Exotic	High Threat Exotic	Growth Form Group	T35		T36		T37		T38		T39		T40	
					C	A	C	A	C	A	C	A	C	A	C	A
Setaria verticillata	Hooked Bristlegrass	Yes	-	-												
Schoenoplectus validus	River Club Rush	-	-	Grass& Grass-like (GG)												
Sloanea australis	Maiden's Bush	-	-	Tree (TG)												
Smilax australis	Barbed Wire Vine	-	-	Other (OG)	**0.1**	**5**	**0.1**	**2**	**0.1**	**3**			**0.1**	**1**	**0.1**	**1**
Smilax glyciphylla	Sweet Sarsaparilla	-	-	Other (OG)												
Solanum aviculare	Kangaroo Apple	-	-	Shrub (SG)												
Solanum capsicoides	Devil's Applie	Yes	-	-												
Solanum hapalum	Hairy Solanum	-	-	Shrub (SG)												
Solanum mauritianum	Wild Tobacco	Yes	-	-												
Solanum nigrum	Blackberry Nightshade	Yes	-	-												
Solanum seaforthianum	Climbing Nightshade	Yes	Yes	-												
Solanum stelligrum	Devil's Needles	-	-	Forb (F)			**0.1**	**1**								
Stephania japonica	Tape Vine	-	-	Other (OG)							**0.1**	**3**	**0.5**	**20**		
Syncarpia glomulifera	Turpentine	-	-	Tree (TG)	**5**				**6**	**3**						
Synoum glandulosum subsp. glandulosum	Scentless Rosewood	-	-	Shrub (SG)	**0.5**	**2**									**0.1**	**1**
Syzygium australe	Brush Cherry	-	-	Shrub (SG)												
Syzygium francisii	Giant Water Gum	-	-	Tree (TG)												
Syzygium moorei	Durroby	-	-	Tree (TG)												
Syzygium luehmannii	Riberry	-	-	Tree (TG)												
Syzygium oleosum	Blue Lilly Pilly	-	-	Shrub (SG)												
Tabernaemontana pandacaqui	Banana Bush	-	-	Shrub (SG)												
Tasmannia insipida	Brush Pepperbush	-	-	Shrub (SG)												
Tephrosia glomeruliflora	Pink Tephrosia	Yes	-	-												
Themeda triandra	Kangaroo Grass	-	-	Grass& Grass-like (GG)							**0.1**	**1**				

Species	Common Name	Exotic	High Threat Exotic	Growth Form Group	T35		T36		T37		T38		T39		T40	
					C	A	C	A	C	A	C	A	C	A	C	A
Toona ciliata	Red Cedar	-	-	Tree (TG)	**0.2**	**1**	**0.3**	**2**			**0.5**	**4**				
Trema tomentosa var. aspera	Native Peach	-	-	Shrub (SG)					**0.2**	**1**						
Tripladenia cunninghamii	Bush Lily	-	-	Tree (TG)												
Tristaniopsis laurina	Water Gum	-	-	Tree (TG)												
Trochocarpa laurina	Tree Heath	-	-	Tree (TG)	**1**	**2**	**1**	**5**								
Trophis scandens	Burny Vine	-	-	Other (OG)												
Typha spp.	-	-	-	Grass& Grass-like (GG)												
Urtica incisa	Scrub Nettle	-	-	Forb (F)												
Verbena bonariensis	Purpletop	Yes	-	-												
Verbena rigida	Slender Vervain	Yes		-							**0.1**	**1**				
Veronica plebeia	Speedwell	-	-	Forb (F)												
Wikstroemia indica	Bootlace Bush	-	-	Shrub (SG)												
Wilkiea huegeliana	Veiny Wilkiea	-	-	Shrub (SG)												
Xanthorrhoea spp.	Grass Tree	-	-	Other (OG)												
Xanthostemon chrysanthus	Golden Penda	-	-	-												
Zieria smithii	Sandfly Zieria	-	-	Shrub (SG)			**0.5**	**10**	**0.1**	**5**	**1**	**20**				

Note: Flora species not recorded within the vegetation integrity survey plots but were observed within the subject site during other survey methods were also listed within the above table.

Appendix 2 - Fauna Data

The following section(s) list the fauna species recorded on the subject site during detailed surveying and lists the methods by which each species was identified. Results are grouped by the Class of species recorded. Those techniques utilised to record fauna are listed below and correlate with the acronyms included within the Survey Methods column of the grouped Survey Results tables. All bolded fauna species are threatened under the *BC Act 2016*.

Survey Method Codes:

A	Stranding/beached
AR	Acoustic recording
B	Burnt
C	Cat kill
D	Dog kill
E	Nest/roost
F	Tracks, scratchings
FB	Burrow
G	Crushed Cones
H	Hair, feathers or skin
I	Subfossil/Fossil Remains
K	Dead
O	Observed
OW	Observed and Heard call
P	Scat
Q	Camera
R	Road kill
S	Shot
T	Trapped or netted
U	Ultrasonic recording
V	Fox kill
W	Heard call
X	In scat
Y	Bone, teeth or shell
Z	In raptor/owl pellet

*	All birds were either directly observed through diurnal survey, spotlighting, camera trap or call identification
**	Introduced/feral species
***	Recorded in adjacent areas or circling overhead
****	Recorded via crushed *Allocasuarina* seeds

BIRDS*

FAMILY	SPECIES NAME	COMMON NAME
Megapodiidae	*Alectura lathami*	Australian Brush-turkey
Phasianidae	*Coturnix ypsilophora*	Brown Quail
Anatidae	*Anas superciliosa*	Pacific Black Duck
Anatidae	*Chenonetta jubata*	Australian Wood Duck
Anhingidae	*Anhinga novaehollandiae*	Australasian Darter
Podicipedidae	*Tachybaptus novaehollandiae*	Australasian Grebe
Columbidae	*Chalcophaps indica*	Emerald Dove
Columbidae	*Columba leucomela*	White-headed Pigeon
Columbidae	*Columba livia***	Rock Dove
Columbidae	*Geopelia humeralis*	Bar-shouldered Dove
Columbidae	*Geopelia striata*	Peaceful Dove

FAMILY	SPECIES NAME	COMMON NAME
Columbidae	*Leucosarcia melanoleuca*	Wonga Pigeon
Columbidae	*Macropygia amboinensis*	Brown Cuckoo-Dove
Columbidae	*Ocyphaps lophotes*	Crested Pigeon
Columbidae	***Ptilinopus magnificus****	**Wompoo Fruit-Dove**
Podargidae	***Podargus ocellatus***	**Marbled Frogmouth**
Podargidae	*Podargus strigoides*	Tawny Frogmouth
Caprimulgidae	*Eurostopodus mystacalis*	White-throated Nightjar
Aegothelidae	*Aegotheles cristatus*	Australian Owlet-nightjar
Ardeidae	*Ardea ibis*	Cattle Egret
Ardeidae	*Egretta novaehollandiae*	White-faced Heron
Threskiornithidae	*Platalea regia*	Royal Spoonbill
Threskiornithidae	*Threskiornis molucca*	Australian White Ibis
Accipitridae	*Accipiter novaehollandiae*	Grey Goshawk
Accipitridae	*Aviceda subcristata*	Pacific Baza
Accipitridae	*Elanus axillaris*	Black-shouldered Kite
Accipitridae	*Haliastur sphenurus*	Whistling Kite
Rallidae	*Fulica atra*	Eurasian Coot
Rallidae	*Gallirallus philippensis*	Buff-banded Rail
Rallidae	*Gallinula tenebrosa*	Dusky Moorhen
Rallidae	*Porphyrio porphyrio*	Purple Swamphen
Rallidae	*Porzana tabuensis*	Spotless Crake
Charadriidae	*Vanellus miles*	Masked Lapwing
Cacatuidae	*Cacatua galerita*	Sulphur-crested Cockatoo
Cacatuidae	*Cacatua sanguinea*	Little Corella
Cacatuidae	*Calyptorhynchus funereus*	Yellow-tailed Black Cockatoo
Cacatuidae	***Calyptorhynchus lathami******	**Glossy Black Cockatoo**
Cacatuidae	*Eolophus roseicapillus*	Galah
Psittacidae	*Alisterus scapularis*	Australian King-Parrot
Psittacidae	***Glossopsitta pusilla***	**Little Lorikeet**
Psittacidae	*Platycercus elegans*	Crimson Rosella
Psittacidae	*Trichoglossus chlorolepidotus*	Scaly-breasted Lorikeet
Psittacidae	*Trichoglossus haematodus*	Rainbow Lorikeet
Centropodidae	*Centropus phasianinus*	Pheasant Coucal
Cuculidae	*Cacomantis flabelliformis*	Fan-tailed Cuckoo
Cuculidae	*Cacomantis variolosus*	Brush Cuckoo
Cuculidae	*Scythrops novaehollandiae*	Channel-billed Cuckoo
Strigidae	*Ninox novaeseelandiae*	Southern Boobook
Tytonidae	*Tyto javanica*	Eastern Barn Owl
Tytonidae	***Tyto tenebricosa***	**Sooty Owl**
Alcedinidae	*Ceyx azureus*	Azure Kingfisher
Alcedinidae	*Dacelo novaeguineae*	Laughing Kookaburra
Alcedinidae	*Todiramphus sanctus*	Sacred Kingfisher
Meropidae	*Merops ornatus*	Rainbow Bee-eater
Coraciidae	*Eurystomus orientalis*	Dollarbird
Climacteridae	*Cormobates leucophaea*	White-throated Treecreeper
Ptilonorhynchidae	*Ailuroedus crassirostris*	Green Catbird

FAMILY	SPECIES NAME	COMMON NAME
Ptilonorhynchidae	*Ptilonorhynchus violaceus*	Satin Bowerbird
Maluridae	*Malurus lamberti*	Variegated Fairy-wren
Maluridae	*Malurus melanocephalus*	Red-backed Fairy-wren
Acanthizidae	*Acanthiza pusilla*	Brown Thornbill
Acanthizidae	*Gerygone mouki*	Brown Gerygone
Acanthizidae	*Sericornis frontalis*	White-browed Scrubwren
Acanthizidae	Sericornis magnirostris	Large-billed Scrubwren
Pardalotidae	*Pardalotus punctatus*	Spotted Pardalote
Pardalotidae	*Pardalotus striatus*	Striated Pardalote
Meliphagidae	*Acanthorhynchus tenuirostris*	Eastern Spinebill
Meliphagidae	*Caligavis chrysops*	Yellow-faced Honeyeater
Meliphagidae	*Entomyzon cyanotis*	Blue-faced Honeyeater
Meliphagidae	*Lichmera indistincta*	Brown Honeyeater
Meliphagidae	*Manorina melanocephala*	Noisy Miner
Meliphagidae	*Manorina melanophrys*	Bell Miner
Meliphagidae	*Meliphaga lewinii*	Lewin's Honeyeater
Meliphagidae	*Myzomela sanguinolenta*	Scarlet Honeyeater
Meliphagidae	*Philemon corniculatus*	Noisy Friarbird
Meliphagidae	*Phylidonyris niger*	White-cheeked Honeyeater
Orthonychidae	*Orthonyx temminckii*	Logrunner
Psophodidae	*Psophodes olivaceus*	Eastern Whipbird
Campephagidae	*Coracina novaehollandiae*	Black-faced Cuckoo-shrike
Campephagidae	*Coracina tenuirostris*	Cicadabird
Campephagidae	*Lalage leucomela*	Varied Triller
Pachycephalidae	*Colluricincla harmonica*	Grey Shrike-thrush
Pachycephalidae	*Colluricincla megarhyncha*	Little Shrike-thrush
Pachycephalidae	*Pachycephala pectoralis*	Golden Whistler
Pachycephalidae	*Pachycephala rufiventris*	Rufous Whistler
Oriolidae	*Oriolus sagittatus*	Olive-backed Oriole
Oriolidae	*Sphecotheres vieilloti*	Australasian Figbird
Artamidae	*Artamus leucorynchus*	White-breasted Woodswallow
Artamidae	*Cracticus nigrogularis*	Pied Butcherbird
Artamidae	*Cracticus tibicen*	Australian Magpie
Artamidae	*Cracticus torquatus*	Grey Butcherbird
Artamidae	*Strepera graculina*	Pied Currawong
Dicruridae	*Dicrurus bracteatus*	Spangled Drongo
Rhipiduridae	*Rhipidura albiscapa*	Grey Fantail
Rhipiduridae	*Rhipidura leucophrys*	Willie Wagtail
Rhipiduridae	*Rhipidura rufifrons*	Rufous Fantail
Corvidae	*Corvus orru*	Torresian Crow
Monarchidae	*Grallina cyanoleuca*	Magpie-lark
Monarchidae	*Monarcha melanopsis*	Black-faced Monarch
Monarchidae	*Symposiachrus trivirgatus*	Spectacled Monarch
Petroicidae	*Eopsaltria australis*	Eastern Yellow Robin
Cisticolidae	*Cisticola exilis*	Golden-headed Cisticola
Megaluridae	*Megalurus timoriensis*	Tawny Grassbird

FAMILY	SPECIES NAME	COMMON NAME
Timaliidae	*Zosterops lateralis*	Silvereye
Hirundinidae	*Hirundo neoxena*	Welcome Swallow
Nectariniidae	*Dicaeum hirundinaceum*	Mistletoebird
Estrildidae	*Neochmia temporalis*	Red-browed Finch
Estrildidae	*Taeniopygia bichenovii*	Double-barred Finch

MAMMALS

FAMILY	SCIENTIFIC NAME	COMMON NAME	METHOD
Tachyglossidae	*Tachyglossus aculeatus*	Short-beaked Echidna	O, Q
Dasyuridae	*Antechinus spp.*	Unidentified Antechinus	H, Q
Peramelidae	*Isoodon macrourus*	Northern Brown Bandicoot	O, Q
Peramelidae	*Perameles nasuta*	Long-nosed Bandicoot	O, Q, X
Phascolarctidae	***Phascolarctos cinereus***	**Koala**	**OW, Q, F, P**
Petauridae	***Petaurus australis******	**Yellow-bellied Glider**	**OW**
Petauridae	*Petaurus breviceps*	Sugar Glider	C
Petauridae	***Petaurus norfolcensis***	**Squirrel Glider**	**O**
Pseudocheiridae	*Petauroides volans*	Greater Glider	O
Pseudocheiridae	*Pseudocheirus peregrinus*	Common Ringtail Possum	O
Phalangeridae	*Trichosurus caninus*	Short-eared Possum	O, Q
Phalangeridae	*Trichosurus vulpecula*	Common Brushtail Possum	O
Macropodidae	*Macropus giganteus*	Eastern Grey Kangaroo	O, X
Macropodidae	*Macropus rufogriseus*	Red-necked Wallaby	O, Q
Macropodidae	***Thylogale stigmatica***	**Red-legged Pademelon**	**O, Q**
Macropodidae	*Thylogale thetis*	Red-necked Pademelon	O, Q
Pteropodidae	*Pteropus alecto*	Black Flying-fox	OW
Pteropodidae	***Pteropus poliocephalus***	**Grey-headed Flying-fox**	**OW**
Molossidae	*Austronomus australis*	White-striped Free-tailed Bat	U
Molossidae	***Mormopterus norfolkensis***	**Eastern Free-tail Bat**	**U**
Molossidae	*Mormopterus ridei*	Eastern Little Free-tailed Bat	U
Rhinolophidae	*Rhinolophus megaphyllus*	Eastern Horseshoe-bat	U
Vespertilionidae	***Chalinolobus dwyeri***	**Large-eared Pied Bat**	**U**
Vespertilionidae	*Chalinolobus gouldii*	Gould's Wattled Bat	U
Vespertilionidae	***Chalinolobus nigrogriseus***	**Hoary Wattled Bat**	**U**
Vespertilionidae	***Miniopterus australis***	**Little Bent-wing Bat**	**U**
Vespertilionidae	***Miniopterus schreibersii oceanensis***	**Eastern Bent-wing Bat**	**U**
Vespertilionidae	***Myotis macropus***	**Southern Myotis**	**U**
Vespertilionidae	***Nyctophilus spp.***	**Unidentified Long-eared Bat**	**U**
Vespertilionidae	***Scoteanax rueppellii***	**Greater Broad-nosed Bat**	**U**
Vespertilionidae	*Scotorepens orion*	Eastern Broad-nosed Bat	U
Vespertilionidae	*Vespadelus pumilus*	Eastern Forest Bat	U
Vespertilionidae	***Vespadelus troughtoni***	**Eastern Cave Bat**	**U**
Muridae	*Rattus fuscipes*	Bush Rat	HT, Q
Muridae	*Melomys cervinipes*	Fawn-footed Melomys	O

Canidae	*Canis lupus familiaris***	Dog	OW, Q, P
Canidae	*Vulpes vulpes***	Red Fox	Q
Felidae	*Felis catus***	Cat	O
Leporidae	*Lepus capensis***	Brown Hare	Q, O
Suidae	*Sus scrofa***	Pig	O, F
Equidae	*Equus caballus***	Horse	O, Q
Bovidae	*Bos taurus***	European Cattle	O

REPTILES

FAMILY	SCIENTIFIC NAME	COMMON NAME	METHOD
Gekkonidae	*Hemidactylus frenatus***	House Gecko	O
Scincidae	*Bellatorias major*	Land Mullet	O
Scincidae	*Harrisoniascincus zia*	Rainforest Cool-skink	O
Scincidae	*Lampropholis delicata*	Dark-flecked Garden Sunskink	O
Scincidae	*Saproscincus challengeri*	Orange-tailed Shadeskink	O
Agamidae	*Intellagama lesueurii*	Eastern Water Dragon	O
Agamidae	*Pogona barbata*	Bearded Dragon	O
Varanidae	*Varanus varius*	Lace Monitor	O, Q, F
Typhlopidae	*Anilios nigrescens*	Blackish Blind Snake	O
Pythonidae	*Morelia spilota*	Carpet Python	O
Colubridae	*Boiga irregularis*	Brown Tree Snake	O
Colubridae	*Dendrelaphis punctulatus*	Common Tree Snake	O
Colubridae	*Tropidonophis mairii*	Freshwater Snake	O
Elapidae	*Cryptophis nigrescens*	Eastern Small-eyed Snake	O
Elapidae	*Pseudonaja textilis*	Eastern Brown Snake	O
Elapidae	*Vermicella annulata*	Bandy Bandy	O

AMPHIBIANS

FAMILY	SCIENTIFIC NAME	COMMON NAME	METHOD
Myobatrachidae	*Adelotus brevis*	Tusked Frog	W
Myobatrachidae	*Crinia signifera*	Common Eastern Froglet	W
Myobatrachidae	*Limnodynastes peronii*	Striped Marsh Frog	OW
Myobatrachidae	*Mixophyes fasciolatus*	Great Barred Frog	OW
Myobatrachidae	***Mixophyes iteratus***	**Giant Barred Frog**	**OW**
Myobatrachidae	*Pseudophryne coriacea*	Red-backed Toadlet	W
Hylidae	*Litoria caerulea*	Green Tree Frog	OW
Hylidae	*Litoria dentata*	Bleating Tree Frog	W
Hylidae	*Litoria fallax*	Eastern Dwarf Tree Frog	OW
Hylidae	*Litoria gracilenta*	Dainty Green Tree Frog	W
Hylidae	*Litoria latopalmata*	Broad-palmed Frog	OW
Hylidae	*Litoria lesueuri*	Lesueur's Frog	OW
Hylidae	*Litoria nasuta*	Rocket Frog	OW
Hylidae	*Litoria pearsoniana*	Cascade Tree Frog	OW

Hylidae	*Litoria peronii*	Peron's Tree Frog	OW
Hylidae	*Litoria verreauxii verreauxii*	Whistling Tree Frog	W
Hylidae	*Litoria wilcoxii*	Stony Creek Frog	OW
Bufonidae	*Rhinella marina***	Cane Toad	OW, R, Q

Appendix 3 - Likelihood of Occurrence Table

Species	NSW Listing Status	EPBC Listing status	Source and Bionet Records	Habitat Requirements	Likelihood of Occurrence & Justification
Fauna					
Pale-vented Bush-hen (*Amaurornis moluccana*)	V	-	Predicted by the BAM calculator. No records within 10km of the site (Bionet, 2019).	This species favors coastal rivers and inlets from the Clarence River, north. It prefers densely overgrown margins of permanent terrestrial freshwater wetlands such as creeks and rivers, billabongs, ponds, swamps, waterholes, dams, lakes and roadside ditches (Muranyi and Baverstock, 1996). Three Bush-hens were recorded from Swamp Mahogany Forest in areas NE of the Cobaki Broadwater in association with fauna survey works undertaken in association with the Tugan Bypass SIS (Ecopro, 2004). PB (2008) has also recorded the bush hen at Banora Point within early regrowth rainforest west of Martinelli Avenue.	Possible – Within the study area, potential habitat may occur in association with Tweed River and watercourses containing dense vegetation. The species was not recorded during avifauna surveys. There are no Bionet records of this species within 10km of the site.
Dusky Woodswallow (*Artamus cyanopterus cyanopterus*)	V	-	Predicted by the BAM calculator. No records within 10km of the site (Bionet, 2019).	Primarily inhabit dry, open eucalypt forests and woodlands, including mallee associations, with an open or sparse understorey of eucalypt saplings, acacias and other shrubs, and ground-cover of grasses or sedges and fallen woody debris. It has also been recorded in shrublands, heathlands and very occasionally in moist forest or rainforest. Also found in farmland, usually at the edges of forest or woodland (OEH, 2019b).	Possible – All forested areas of the site provide potential habitat for the species. The species was not recorded during survey efforts and there a no Bionet record occurring within 10km of the site.
White-crowned Snake (*Cacophis harriettae*)	V	-	Predicted by the BAM calculator. No records within 10km of the site (Bionet, 2019).	Favours low to mid-elevation dry eucalypt forest and woodland, particularly areas with a varied and well-developed litter layer, where their prey of small lizards may be more abundant. Also occasionally found in moist eucalypt forest and coastal heathland (OEH. 2019b). Primarily eats invertebrates, mainly insects, which are captured whilst hovering or sallying above the canopy or over water. Also frequently hovers, sallies and pounces under the canopy, primarily over leaf litter and dead timber. Also occasionally take nectar, fruit and seed (OEH, 2019b)	Possible – Potential habitat for the species occurs in the form of eucalypt forests containing a well-developed leaf litter layer. The species was not detected during survey efforts. There are no Bionet records of this species within 10km of the site.
Glossy Black-cockatoo (*Calyptorhynchus lathami*)	V	-	Predicted by the BAM calculator. 2 records within 10km of the site (Bionet, 2019).	Glossy Black Cockatoos are uncommon parrots found in scattered localities in the forests and woodlands of eastern Australia and Kangaroo Island (Forshaw, 1981). The eastern subspecies of Glossy Black Cockatoos seems thinly distributed through its range with the highest densities occurring in south-eastern Queensland and north-eastern New South Wales (Forshaw, 1989). The main habitat of the eastern subspecies is *Eucalyptus* woodlands and forest with moderate-high densities of *Allocasuarina* which are required for feeding (Clout, 1989; Park & Borsboom, 1996; Forshaw & Cooper, 1989; Crome & Shields, 1992; Cleland & Sims, 1968; Garnett, 1992b; Blakers *et al*, 1984). Suitable senescent trees (large hollow within a live or dead Eucalypt: 10-20m, Depth: 40-120cm, Entry: ~21cm: Inside Dia: ~23cm (Forshaw, 1981; Gibbons & Lindenmayer, 2002)) are also required for nesting.	Recorded – Although not directly recorded during the survey period, evidence of the species (*Allocasuarina* chew cones) utilising the study area was observed. Targeted surveys failed to record the species utilizing the development site for breeding purposes.
White-eared Monarch (*Carterornis leucotis*)	V	-	Predicted by the BAM calculator. 5 records within 10km of the site (Bionet, 2019).	This species generally occurs within Coastal/Subtropical/Littoral Rainforests and occasionally Eucalypt/Riparian Forest, Mangroves and Swamp Sclerophyll with mesomorphic understorey along the eastern coast of Australia from Cape York to the Tweed River (Readers Digest, 2002; DEC, 2005). The Tweed Birds Observers (2005) do note that the species has been sighted along the Terranora Broadwater (online @http://www. bigvolcano. com.au/custom/birdos/media/brochure/brochure.htm). It has also been recorded within lowland rainforest habitats further to the north of the Cobaki Broadwater (Sandpiper Ecological, 2001).	Possible – Marginal habitat is present for the species in the form of eucalypt forests although preferred rainforest absent from the development footprint. The species was not recorded during targeted avifauna surveys. There are Bionet records of his species within 10km of the subject site with the nearest one ~3.5km northeast within Glen Warning.
Eastern Pygmy-possum (*Cercartetus nanus*)	V	-	Predicted by the BAM calculator.	The Eastern Pygmy-possum is found in south-eastern Australia, from southern Queensland to eastern South Australia and in Tasmania. In NSW it extents from the coast inland as far as the Pilliga, Dubbo, Parkes and Wagga Wagga on the western slopes (OEH, 2018c).	Possible – Although, potential habitat for the species occurs in the form of eucalypt forest, the pygmy possum was not recorded during

Species	NSW Listing Status	EPBC Listing status	Source and Bionet Records	Habitat Requirements	Likelihood of Occurrence & Justification
			No records within 10km of the site (Bionet, 2019).	Found in a broad range of habitats from rainforest through sclerophyll (including Box-Ironbark) forest and woodland to heath, but in most areas woodlands and heath appear to be preferred, except in northeastern NSW where they are most frequently encountered in rainforest (OEH, 2018c). Feeds largely on nectar and pollen collected from banksias, eucalypts and bottlebrushes; an important pollinator of heathland plants such as banksias; soft fruits are eaten when flowers are unavailable. Also feeds on insects throughout the year; this feed source may be more important in habitats where flowers are less abundant such as wet forests (OEH, 2018c). It shelters in tree hollows, rotten stumps, holes in the ground, abandoned bird-nests, Ringtail Possum (*Pseudocheirus peregrinus*) dreys or thickets of vegetation, (e.g. grass-tree skirts); nest-building appears to be restricted to breeding females; tree hollows are favoured but spherical nests have been found under the bark of eucalypts and in shredded bark in tree forks (OEH, 2018c).	survey efforts and there are no Bionet records within 10km of the site.
Large-eared Pied Bat (*Chalinolobus dwyeri*)	V	V	Predicted by the BAM calculator. No records within 10km of the site (Bionet, 2019).	The Large-eared Pied Bat occurs within drier habitats, including dry sclerophyll forests and woodlands (Hoye and Schulz in Van Dyck and Strahan, 2008) although it has been recorded within a range of habitats, including wet and dry sclerophyll forest, Cyprus pine dominated forest, tall open eucalypt forest with a rainforest sub-canopy, sub-alpine woodland, but typically in association with sandstone relief. Much of the known distribution is within NSW. Available records suggest that the largest concentrations of populations appear to be in the sandstone escarpments of the Sydney basin and the north-west slopes (Coolah Tops, Mt Kaputar, Warrumbungle National Park (NP) and Pilliga Nature Reserve (NR). Although the species is widely distributed, it is uncommon and patchy within this area. Sightings of note include Tottenham, west of Narromine (NSW), which is the furthest west record (Shelly 2001); Swansea Open Cut Mine area of the Wallarah Peninsula, north coast NSW (Conacher Travers 2006); a disused gold mine near Barraba (NSW) that included lactating females and dependent young (Spark 2011 pers. comm. cited in Qld DERM 2011); and Moreton NP (NSW) at the southern end of the species' range (Hoye 2005). 'Little is known about the habitat and roosting requirements of the Large-eared Pied Bat, but natural roosts may depend heavily on sandstone outcrops. It has been found roosting in disused mine shafts, caves, overhangs and disused Fairy Martin (*Hirundo ariel*) nests for shelter and to raise young (Hoye & Dwyer 1995; Schulz 1998).	Recorded – The species was recorded on several occasions during the survey period via ANABAT technique. Sandstone outcrops suitable for roosting does not occur within the site.
Hoary Wattled Bat (*Chalinolobus nigrogriseus*)	V	-	Predicted by the BAM calculator. No records within 10km of the site (Bionet, 2019).	In NSW the Hoary Wattled Bat occurs in dry open eucalypt forests, favouring forests dominated by Spotted Gum, boxes and ironbarks, and heathy coastal forests where Red Bloodwood and Scribbly Gum are common. Because it flies fast below the canopy level, forests with naturally sparse understorey layers may provide the best habitat (DEH, 2012 online @ http://www.environment.nsw.gov.au/threatenedspeciesapp/profile.aspx?id=10158). This species is a continuous flight forager that primarily searches for a variety of insects close above the canopy and within openings in forested habitat (Fenton 1982, Allison 1995, Churchill 1998). It also forages over open ground adjacent to forested habitat (McKenzie and Rolfe 1986). The presence of insects, such as wingless ants, in scats suggests that some gleaning off foliage and other surfaces occurs (Vestjens and Hall 1977, Allison 1995) in Lumsden et al, 2005: 131). Roosting has been recorded in tree hollows and rock crevices (Kutt et al in Van Dyck and Strahn, 2008).	Recorded – All forested habitats of the site represent potential habitat for the Hoary Wattled Bat which is also known to forage over modified habitats such as grasslands.
Three-toed Snake-tooth Skink (*Coeranoscincus reticulatus*)	V	V	Predicted by the BAM calculator. No records within 10km of the site (Bionet, 2019).	The Three-toed Snake-tooth Skink occurs within rainforest and occasionally moist eucalypt forest, on loamy or sandy soils. Loose soil, leaf litter and rotting logs provide suitable habitat for this skink species. The Three-toed Snake-tooth Skink feeds on earthworms and beetle grubs (NSW DECC, 2005). There are two published records of individuals in logged forest which had tall softwood regrowth. Within forests, this species is found in well-mulched, loose, friable rainforest soil in leaf litter, often immediately adjacent to fallen tree trunks. Much of the lowland closed forest within its range has been cleared for agriculture and grazing, pasture improvement, crop production, tropical fruit production, and native forest logging. Suitable habitat has generally been reduced to patches, especially in lowland areas (DEWHA, 2013).	Unlikely – Preferred rainforest type habitats on loamy or sandy soils is absent from the development site. The species was not recorded during survey efforts. There are no Bionet records of this species within 10km of the site.

Species	NSW Listing Status	EPBC Listing status	Source and Bionet Records	Habitat Requirements	Likelihood of Occurrence & Justification
Coxen's Fig-Parrot (*Cyclopsitta diophthalma coxeni*)	CE	E	Predicted by the BAM calculator. No records within 10km of the site (Bionet, 2019).	The small, predominantly green Coxen's Fig Parrot is found wherever fig trees are present in lowland and upland forest types, riparian corridors, farmland and urban environments (Coxen's Fig-Parrot Recovery Team 2001). Seeds of native figs are the major food source of this endangered bird species (Forshaw 1981, Romer and Spittall 1994, Pizzey and Knight 1997). The Moreton Bay Fig (*Ficus macrophylla*) and Green-leaved Strangler Fig (*F. watkinsiana*) are preferred species. Other fig species also selected as food source are Rusty Fig (*F. rubiginosa*), White Fig (*F. virens*), Small-leaved Fig (*F. oblique*), Cluster Fig (*F. racemosa*), Sandpaper Figs (*F. coronata*), and *F. fraseri* and deciduous fig *F. superba* (Holmes 1990, Gynther et al. 1998). Other likely food sources include fruits of Lilly-Pillies (*Syzygium* spp., *Acmena* spp.), Blue Quandong (*Elaeocarpus grandis*), bolly gum (*Litsea australis*), Red Ash (*Alphitonia excelsa*) and nectar of Silky Oaks (*Grevillea robusta*) (Holmes 1990, Irby 1930). The Coxen's Fig Parrot may obtain a source of zinc through consumption of lichens (Romer and Spittall 1994). Fruiting trees in gardens and cultivated farmlands may also be suitable as food source, including Edible Fig (*F. carica*), Cotoneaster (*Cotoneaster lacteus*), Queen Palm (*Syagrus romanzoffiana*) and Loquat (*Eriobotrya japonica*) (Holmes 1990, Gynther et al. 1998, Forshaw 1969). Most records of Coxen's Fig-Parrot have been taken within small remnant stands, forest edges (Holmes 1994) or thin strips of gallery forest (Norris 1964). Subtropical rainforest, dry rainforest, sclerophyll forest and subtropical rainforest are preferred nesting sites (Coxen's Fig-Parrot Recovery Team 2001). High trees within or near the edge of rainforest are suitable for nesting. The nest chamber is found to be within the excavated underside of a dead or decaying limb or trunk in a living or dead tree. Habitat clearing and fragmentation are the major threats of this species (Holmes 1995, Pizzey and Knight 1997). Coxen's Fig-Parrot is estimated to occur in four subpopulations: greater Bundaberg region, Maleny/Imbil/Kin Kin Creek area, the Qld/NSW border area (Lamington National Park, Whian Whian State Forest, Alstonville plateau), and the upper Hastings River catchment. This estimate is considered to be of low reliability (i.e. there is uncertainty about the number of subpopulations and the extent of genetic separation between subpopulations) (Garnett & Crowley 2000 in DSEWPC, 2013). Most recent records of the species are recorded from the Lamington Plateau (Qld) with only seven unconfirmed sightings recorded from NSW since 1981. It is estimated that the remaining wild population of the species may be less than 100 individuals (DSEWPC, 2013).	Unlikely – It is considered that the site does not represent suitable habitat for the species given the scarcity of Figs. The species was not recorded during fauna survey works. There are no Bionet records of this species within 10km of the site.
Barred Cuckoo-shrike (*Coracina lineata*)	V	-	Predicted by the BAM calculator. No records within 10km of the site (Bionet, 2019).	This species has been recorded from a variety of habitats including rainforest, eucalypt forests and woodlands, clearings in secondary growth, swamp woodlands and timber along watercourses within Coastal NSW (NPWS, 2002). Foraging requirements include fruiting tree species within in rainforest, wet sclerophyll forest, vegetation remnants or isolated trees (DEC, 2005) and insects captured among foliage (NPWS, 2002).	Possible – The majority of the site provides potential habitat for the barred cuckoo-shrike. The species was not recorded during survey efforts and there a no Bionet record occurring within 10km of the site.
Varied Sittella (*Daphoenositta chrysoptera*)	V	-	Predicted by the BAM calculator. No records within 10km of the site (Bionet, 2019).	"The Varied Sittella is sedentary and inhabits most of mainland Australia except the treeless deserts and open grasslands, with a nearly continuous distribution in NSW from the coast to the far west (Higgins and Peter 2002; Barrett *et al.* 2003). It inhabits eucalypt forests and woodlands, especially rough-barked species and mature smooth-barked gums with dead branches, mallee and *Acacia* woodland. The Varied Sittella feeds on arthropods gleaned from crevices in rough or decorticating bark, dead branches, standing dead trees, and from small branches and twigs in the tree canopy. It builds a cup-shaped nest of plant fibres and cobweb in an upright tree fork high in the living tree canopy, and often re-uses the same fork or tree in successive years" (DECC, 2009 online @ http://www.environment.nsw.gov.au/determinations/variedsittellapd.htm).	Possible – All forested areas of the site provide potential habitat for the species. The species was not recorded during survey efforts and there a no Bionet record occurring within 10km of the site.
Spotted-tailed Quoll (*Dasyurus maculatus*)	V	E	Predicted by the BAM calculator. No records within 10km of the site (Bionet, 2019).	The species has been recorded from a wide range of habitats such as rainforest, open forest, woodland, coastal heathland, and inland riparian forest (Edgar and Belcher, 2002; Forest Practices Board, 2002). Additional habitat requirements include suitable den sites (such as hollow logs, tree hollows, rock outcrops or caves) and an abundance of food (such as birds and small mammals) (NSWNPWS, 1999; Edgar & Belcher, 2001; Belcher, 2000; Jones & Ross, 1996). Habitat range for males has been estimated to be as large as 2000-2200 hectares per individual, while for females, which are more protective of their dens, this value is considerably less at between 700-850 hectares per individual (Belcher, 2000; NPWS, 1999). In addition, Quolls are known to frequently swap dens and disperse large distances on any one night. A radio-tracking survey performed by Andrew (2005) noted that quolls generally moved	Possible – The site provides potential habitat for the quoll given its large range utilizing a wide variety of habitat. Hair funnel, spotlighting and motion trigger camera efforts conducted failed to record the quoll.

Species	NSW Listing Status	EPBC Listing status	Source and Bionet Records	Habitat Requirements	Likelihood of Occurrence & Justification
				to a new den each day and 90% of stays for females and 76% of stays for males were for a single day. Population density is therefore naturally quite low and has been estimated at 1 individual per 3 km2 even within optimal 'core' habitat (Jones & Rose, 1996).	There are no Bionet records occurring within 10km of the site.
Eastern False Pipistrelle (*Falsistrellus tasmaniensis*)	V	-	Predicted by the BAM calculator. No record within 10km of the site (Bionet, 2019).	This species is known from Tasmania and the mainland where it inhabits wet sclerophyll and coastal mallee. Preference is shown for tall, wet forests with an canopy layer of more than 20m and a dense understorey and in association with larger patches of forest with small patches typically avoided. Roosting generally occurs within hollow bearing eucalypts in groups of 3-80, usually in single sex group with roost swapping occurring on most nights. Roosting has also been recorded in caves (Jenolan NSW) and old buildings (Law, Herr, and Phillips in Van Dyck and Strahan, 2008; Churchill, 2008; DEH, 2014; Wildcare Aust., 2013; Kitchener, Caputi and Jones, 1986).	Possible - All forested areas of the site provide potential habitat for the species. The species was not recorded during ANABAT surveys and there a no Bionet record occurring within 10km of the site.
Little Lorikeet (*Glossopsitta pusilla*)	V	-	1 record within 10km of the site (Bionet, 2019).	"The distribution of the Little Lorikeet extends from just north of Cairns, around the east coast of Australia, to Adelaide. In New South Wales Little Lorikeets are distributed in forests and woodlands from the coast to the western slopes of the Great Dividing Range, extending westwards to the vicinity of Albury, Parkes, Dubbo and Narrabri (Barrett *et al.* 2003). There is no evidence of regular migration, but Little Lorikeets are generally considered to be nomadic (Higgins 1999), with irregular large or small influxes of individuals occurring at any time of year, apparently related to food availability. However, long term investigation of the breeding population on the north-western slopes indicates, that breeding birds are resident from April to December, and even during their non-resident period, they may return to the nest area for short periods if there is some tree-flowering in the vicinity (Courtney & Debus 2006). Little Lorikeets mostly occur in dry, open eucalypt forests and woodlands. They have been recorded from both old-growth and logged forests in the eastern part of their range, and in remnant woodland patches and roadside vegetation on the western slopes. In south-east Queensland (Smyth *et al.* 2002), Little Lorikeets were more likely to occupy forest sites with relatively short to intermediate logging rotations (15–23 years) and sites that have had short intervals (2.5– 4 years) between fires" (DECC, 2009 online @ http://www.environment.nsw.gov.au/determinations/littlelorikeetpd.htm)	Recorded – Potential foraging habitat occurs in association with eucalypt forests of the site during flowering periods. The species was recorded flying over the subject site during dusk avifauna survey.
Pale-headed Snake (*Hoplocephalus bitorquatus*)	V	-	Predicted by the BAM calculator. No records within 10km of the site (Bionet, 2019).	A patchy distribution from north-east Queensland to the north-eastern quarter of NSW. In NSW it has historically been recorded from as far west as Mungindi and Quambone on the Darling Riverine Plains, across the north west slopes, and from the north coast from Queensland to Sydney. A small number of historical records are known for the New England Tablelands from Glenn Innes and Tenterfield; however, the majority of records appear to be from sites of relatively lower elevation (OEH. 2019b). The snake is found mainly in dry eucalypt forests and woodlands, cypress forest and occasionally in rainforest or moist eucalypt forest. In drier environments, it appears to favour habitats close to riparian areas (OEH, 2018c). It shelters during the day between loose bark and tree-trunks, or in hollow trunks and limbs of dead trees (OEH, 2018c). The main prey is tree frogs although lizards and small mammals are also taken (OEH. 2019b).	Possible – Potential habitat for the species occurs within the site in the form of eucalypt forests containing a well-developed leaf litter layer with logs. The species was not detected during survey efforts. There are no Bionet records of this species within 10km of the site. .
Stephens' Banded Snake (*Hoplocephalus stephensii*)	V	-	Predicted by the BAM calculator. 1 record within 10km of the site (Bionet, 2019).	Stephens' Banded Snake is nocturnal, and shelters between loose bark and tree trunks, amongst vines, or in hollow trunks limbs, rock crevices or under slabs during the day (OEH. 2019b). Stephen's Banded Snake occurs in Rainforest and eucalypt forests and rocky areas up to 950 m in altitude where it hunts frogs, lizards, birds and small mammals at night (OEH. 2019b).	Possible – Potential habitat for the species occurs within the site in the form of eucalypt forests containing logs and leaf debris. The species was not detected during survey efforts. A Bionet record (2009) of this snake occurs within Byrill Creek approximately 1km north of the subject site.

Species	NSW Listing Status	EPBC Listing status	Source and Bionet Records	Habitat Requirements	Likelihood of Occurrence & Justification
Golden-tipped Bat (*Phoniscus papuensis*)	V	-	Predicted by the BAM calculator. No records within 10km of the site (Bionet, 2019).	Found in rainforest and adjacent wet and dry sclerophyll forest up to 1000m. Also recorded in tall open forest, *Casuarina*-dominated riparian forest and coastal *Melaleuca* forests (OEH. 2019b). Roost mainly in rainforest gullies on small first- and second-order streams in usually abandoned hanging Yellow-throated Scrubwren and Brown Gerygone nests modified with an access hole on the underside. Bats may also roost under thick moss on tree trunks, in tree hollows, dense foliage and epiphytes (OEH. 2019b).	Possible - All forested areas of the site provide potential habitat for the species. Suitable roosting habitat is considered absent from the development site. The species was not recorded during ANABAT surveys and there a no Bionet record occurring within 10km of the site.
Green-thighed Frog (*Litoria brevipalmata*)	V	-	Predicted by the BAM calculator. No records within 10km of the site (Bionet, 2019).	The Green-thighed Frog is a poorly understood and relatively recently discovered species which occurs within forests and swamps of the coast and adjacent ranges from central NSW to SEQLD (Cogger, 2000; Barker et al, 1995, Hines et al, 1999). Robinson (1993), Griffiths (1997) and Cogger (2000) list the breeding season as summer whereas Barker *et al.* (1995) record it as October and January. Calling has been documented to last for only a few days at a time (Nattrass and Ingram 1993; Barker *et al.* 1995) and has been noted to occur in association with "heavy rains" *(Barker et* al.1995; Ehmann 1997). Males are noted to call around flooded semi-permanent or ephemeral pools, usually in grassy areas (Robinson 1993; Barker *et al.* 1995; Cogger 2000). This species may have varying habitat requirements across its range. Cogger (2000), Robinson (1993) and Barker *et al.* (1995) all record this species to be associated with moist forests (swamp forests, wet sclerophyll forest and rainforest). However, records from the northern parts of its range appear to predominantly come from dry sclerophyll forest (McDonald 1974; Czechura 1978; Nattrass and Ingram 1993; Aridis, 1996) [in Lemckert et al, 2006: 1].	Possible – Potential habitat for the green-thighed frog occurs in association with streams and low-laying areas subject to ponding within forested areas of the site. The species was not recorded during amphibian survey efforts and there are no Bionet records occurring within 10km of the site.
Square-tailed Kite (Foraging) (*Lophoictinia isura*)	V	-	Predicted by the BAM calculator. No records within 10km of the site (Bionet, 2019).	This species typically prefers the coastal forested and wooded lands of tropical and temperate Australia where it appears to occupy large hunting ranges of more than 100km^2 (Marchant & Higgins 1993; NPWS, 1999; DEC, 2005). 'It particularly favours productive forests on the coastal plain, box-ironbark-gum woodlands on the inland slopes, and Coolibah/River Red Gum on the inland plains (Marchant & Higgins 1993). It also forages over coastal heathlands, and often near openings and edges of forest. The Square-tailed Kite will forage around suburban trees and shrubs, and nest in urban bushland. On the Mid-north Coast of NSW, landscapes within a 2 km radius of the nest sites of 11 pairs of Square-tailed Kites had a high proportion of young and older-aged regrowth Blackbutt forest, when compared with random sites (Kavanagh *et al.* 2001)' (NSW Scientific Committee, 2009:1) A common feature of the kite's habitat is the presence of profuse eucalypt blossom and attendant nectivorous/passerine birds which are the favoured prey of the kite (Readers Digest, 2002, NPWS, 1999). In eastern NSW, neighbouring nests of the Square-tailed Kite are about 13 km apart, with a density of one pair per 170 km^2, and home range of roughly 50 km^2 (Lutter *et al.* 2004). The Square-tailed Kite is highly mobile and dispersive, with southern populations migrating to winter in the tropics (Marchant & Higgins 1993; EPA, 2002). It is inferred not to be susceptible to population fragmentation (NSW Scientific Committee, 2009).	Possible – The site may fall within the kite's large hunting range although the species was not detected during survey efforts. No large raptor nests were recorded within the development site. There are no Bionet records of this species within 10km of the site.
Black-striped Wallaby (*Macropus dorsalis*)	E	-	Predicted by the BAM calculator. No records within 10km of the site (Bionet, 2019).	The Black-striped Wallaby is known from the Townsville area in Queensland to northern NSW where it occurs on both sides of the Great Divide. On the north west slopes of NSW, it occurs in Brigalow remnants to south of Narrabri. On the north coast it is confined to the upper catchments of the Clarence and Richmond Rivers (OEH. 2019b). Preferred habitat is characterised by dense woody or shrubby vegetation within three metres of the ground. This dense vegetation must occur near a more open, grassy area to provide suitable feeding habitat.	Unlikely – The site does not occur west of Kyogle (geographic limitation) nor was the species recorded during survey efforts. There are no Bionet records of this species within 10km of the site.
Parma Wallaby (*Macropus parma*)	V	-	Predicted by the BAM calculator. No records within 10km of the site (Bionet, 2019).	Preferred habitat is moist eucalypt forest with thick, shrubby understorey, often with nearby grassy areas, rainforest margins and occasionally drier eucalypt forest (OEH. 2019b). Typically feed at night on grasses and herbs in more open eucalypt forest and the edges of nearby grassy areas. On the north coast, closely associated with dry rainforest but also occur in moist eucalypt forest with a rainforest understorey or a dense shrub layer (OEH. 2019b).	Possible – Potential habitat for the parma wallaby occurs in association with eucalypt forests containing a dense understory. The species was not recorded during survey efforts and there are no Bionet records occurring within 10km of the site.

Species	NSW Listing Status	EPBC Listing status	Source and Bionet Records	Habitat Requirements	Likelihood of Occurrence & Justification
Little Bentwing-bat (*Miniopterus australis*)	V	-	Predicted by the BAM calculator. 2 records within 10km of the site (Bionet, 2019).	This species utilises well-timbered habitats including rainforest, *Melaleuca* swamps and dry sclerophyll forests where it It feeds on insects within the canopy and requires caves, mines, stormwater drains and/or tree hollows to roost (Strahan eds, 2002). DECC (2005) note the following additional particulars with regard to the little bentwing bat: • Maternity colonies form in spring. Males and juveniles disperse in summer. • Only five nursery sites /maternity colonies are known in Australia. • Moist eucalypt forest, rainforest, vine thicket, wet and dry sclerophyll forest, Melaleuca swamps, dense coastal forests and banksia scrub. Generally found in well-timbered areas. • Little Bentwing-bats roost in caves, tunnels, tree hollows, abandoned mines, stormwater drains, culverts, bridges and sometimes buildings during the day, and at night forage for small insects beneath the canopy of densely vegetated habitats. • They often share roosting sites with the Common Bentwing-bat and, in winter, the two species may form mixed clusters. • In NSW the largest maternity colony is in close association with a large maternity colony of Common Bentwing-bats (*M. schreibersii*) and appears to depend on the large colony to provide the high temperatures needed to rear its young.	Recorded – All forested areas of the site provide potential foraging habitat for the little bent-wing bat. The species was recorded on numerous occasions during ANABAT surveys of the site. No breeding sites were recorded within the site. Only five nursery sites /maternity colonies are known in Australia which are located within limestone caves.
Large Bentwing-bat (*Miniopterus orianae oceanensis*)	V	-	Predicted by the BAM calculator. No records within 10km of the site (Bionet, 2019).	This species usually forages on insects within intact, well timbered forest complexes and have been found to roost within caves, tunnels, stormwater culverts or disused mining areas (Strahan eds, 2002; DEH, 2005). They utilise a broad range of habits including wet and dry sclerophyll forest, open woodland, paperbark forests, rainforests and open grasslands (North & Pasic, 2006). Twelve known maternity roost sites occur within its distribution ranging from tens of thousands to >100000 individuals. The known large roost sites are located in limestone and sandstone caves, abandoned gold mines, concrete bunkers and lava tubes. Outside the breeding season the eastern bentwing often selects cool areas within caves, mines, tunnels, drains and bridges (Hoye & Hall in Van Dyck & Strahan, 2008).	Recorded – All forested areas of the site provide potential foraging habitat for the eastern bent-wing bat. The species was recorded on several occasions during ANABAT surveys of the site. Known maternity roost type habitat (limestone and sandstone caves, abandoned gold mines, concrete bunkers and lava tubes) does not occur within the site.
Giant Barred Frog (*Mixophyes iteratus*)	E	E	Predicted by the BAM calculator. 26 records within 10km of	The Giant Barred Frog occurs in rainforests and wet sclerophyll forests in upper to lower catchment areas (Ingram & McDonald 1993). During surveys in the Cooroy to Curra area of south-east Queensland, Giant Barred Frogs were observed to prefer a closed forest canopy with a relatively light cover of vegetation at ground level (Aland & Wood 2013). Populations of the species have been found in cleared or disturbed areas, for example cattle farms with vegetated riparian strips and regenerated logged areas (Hero & Shoo n.d., cited in Hines et al. 2004; Ingram & McDonald 1993). Many sites where the Giant Barred Frog is known to occur are the lower reaches of streams which	Recorded – The species has been recorded along several watercourses occurring within the study area. All recorded locations are well removed from the proposal footprint.

Species	NSW Listing Status	EPBC Listing status	Source and Bionet Records	Habitat Requirements	Likelihood of Occurrence & Justification
			the site (Bionet, 2019).	have been affected by major disturbances such as clearing, timber harvesting and urban development in their headwaters (Hines et al. 1999).	The species was not recorded within the development footprint.
Northern Free-tailed Bat (Ozimops *lumsdenae*)	V	-	Predicted by the BAM calculator. No records within 10km of the site (Bionet, 2019).	Beccari's freetail utilises a range of vegetation types including rainforest, riverine and floodplain margins with paperbark and pandanus, eucalypt open forest/woodland and mostly along watercourses (McKenzie & Bullen in Van Dyck and Strahan, 2008). Surveys in the Kimberley found this freetail bat to be widespread in low numbers in all natural habitats but was not detected in agricultural areas (Churchill, 2008). Roosting occurs in tree hollows and under building roofs (Australian Museum, 1999; Churchill, 2008). DECC (2005) notes that the only confirmed record in NSW is of a colony found in the roof of a house in Murwillumbah.	Possible – All forested areas of the site provide potential foraging habitat for the northern freetail-bat. The species was not recorded during ANABAT surveys of the site and there are no Bionet records occurring within 10km of the site.
Eastern Freetail-bat (*Micronomus norfolkensis*)	V	-	Predicted by the BAM calculator. No records within 10km of the site (Bionet, 2019).	This species has been recorded in dry eucalypt forest and coastal woodlands but individuals have been captured in riparian zones in rainforest and wet sclerophyll forest and mangrove forests east of the Great Dividing Range (Allison and Hoye, 1995; DEC, 2005). An extensive study near Coffs Harbour found it to be more active on the upper slopes where flyways are large than along creeklines (Hoye, Law and Allison in Van Dyck and Strahan, 2008). The species forages upon insects above the forest canopy or at forest edges (Allison, 1983). It is known to roost in tree hollow, particularly in hollow spouts, but occasionally found in buildings (Gilmore and Parnaby, 1994; Allison and Hoye, 1995; DEC, 2005). Recent studies performed by McConville et al (2013) indicate that mangrove habitats may also provide important roost sites.	Recorded – All forested areas of the site provide potential foraging habitat for the eastern freetail-bat. The species was recorded during ANABAT surveys of the site.
Southern Myotis (*Myotis macropus*)	V	-	Predicted by the BAM calculator. 6 records within 10km of the site (Bionet, 2019).	The Myotis roosts within caves, tunnels, hollow-bearing trees, bridges, buildings and dense tree foliage always in close proximity to permanent water (NPWS, 2002; Richards, 2002). It forages over waterbodies where it scoops insects and small fish from the water surface or catches insects aerially (DEH, 2005; Menkhorst, 1996; Richards, 2002). It has been recorded foraging over small creeks, coastal rivers, estuaries, lakes and inland rivers (Law & Anderson, 1999) and other smaller waterbodies including farm dams (Law et al, 1998).	Recorded – Potential habitat occurs for the southern myotis in association with the onsite waterbodies. Hollows in close proximity to waterbodies are present although no roosting sites were recorded. The species was recorded during ANABAT surveys of the site.
Barking Owl (*Ninox connivens*)	V	-	2 records within 10km of the site (Bionet, 2019).	The Barking Owl lives in forests and woodlands of tropical, temperate and semi-arid zones. Its habitat is typically dominated by eucalypts, often red gum species and, in the tropics, paperbarks *Melaleuca* species. It usually roosts in or under dense foliage in large trees including rainforest species of streamside gallery forests, River She-oak *Casuarina cunninghamiana*, other *Casuarina* and *Allocasuarina* species, eucalypts, *Angophora* or *Acacia* species. Roost sites are often near watercourses or wetlands. It typically breeds in hollows of large eucalypts or paperbarks, usually near watercourses or wetlands. Barking Owls have been recorded in remnants of forest and woodland and in clumps of trees at farms, towns and golf courses. DECC (2005) notes that large home ranges of 30-200 hectares are occupied by the owl.	Possible - The site may fall within the hunting range for the barking owl given the species' large range. The barking owl was not recorded during targeted survey efforts. Several suitable sized hollows occur within the subject site although no evidence of roosting was observed. A Bionet record (2010) occurs along Byrrill Creek Road approximately 1km north of the subject site.
Powerful Owl (*Ninox strenua*)	V	-	Predicted by the BAM calculator. 2 records within 10km of the site (Bionet, 2019).	This species of Owl occupies a very large (800-1000ha) permanent range within mostly wet sclerophyll forests and woodlands in southeastern Australia (NPWS, 2002; NPWS, 2005). Within this range its favoured prey include large arboreal mammals (greater glider, brushtail possum) although additional smaller prey (flying fox, sugar glider, ringtail possum, rabbit, birds) are also taken (NPWS, 1997; 2005). Kavanagh & Stanton (2002) note that small (<200 ha) fragments do not provide a significant reservoir for populations of large forest owl (Sooty, Powerful, Masked) species.	Possible - The site may fall within the hunting range for the powerful owl given the species' large range. The powerful owl was not recorded during targeted survey efforts.

Species	NSW Listing Status	EPBC Listing status	Source and Bionet Records	Habitat Requirements	Likelihood of Occurrence & Justification
				Roosting occurs within 'groves of dense mid-canopy trees or tall shrubs in sheltered gullies, typically on wide creek flats and at the heads of minor drainage lines, but also adjacent to cliff faces and below dry waterfalls. Roosting sites are commonly among small groves of up to 2 ha of similar-sized trees with dense foliage in the height range 3-15 m. (Data from Kavanagh 1997, Kavanagh 2002b in DEC, 2005; 8). Nesting has been recorded in over-mature eucalypts within 100m of streams/drainage lines in large hollows (>45cm dia; 100cm deep) surrounded by canopy trees and subcanopy or understorey trees or tall shrubs The owl is faithful to traditional nesting hollows, but also sometimes uses alternative hollows in the nesting gully (Data from Schodde and Mason 1980, McNabb 1996, Kavanagh 1997, Kavanagh 2002b, Higgins 1999 in DEC, 2005: 8).	Several suitable sized hollows occur within the subject site although no evidence of roosting was observed. The nearest Bionet record (2001) occurs ~2.5km northeast of the subject site near Glen Warning.
Eastern Tube-nosed Bat (*Nyctimene robinsoni*)	V	-	2 records within 10km of the site (Bionet, 2019).	Known from coastal areas of north-eastern Australia from Cape York south to the far north-east corner of NSW. Few records from NSW, including the Nightcap, Tweed and Burringbar Ranges and in the vicinity of Mt Warning (OEH. 2019b). Favour streamside habitats within coastal subtropical rainforest and moist eucalypt forests with a well-developed rainforest understorey (OEH. 2019b).	Unlikely – Preferred habitat is considered absent from the development footprint. The species was not recorded during nocturnal survey efforts. Nearest Bionet Record (1999) occurs within Mebbin National Park ~1km west of the subject site.
Eastern Long-eared Bat (*Nyctophilus bifax*)	V	-	Predicted by the BAM calculator. 2 records within 10km of the site (Bionet, 2019).	This species of bat inhabits lowland subtropical rainforest and wet and swamp eucalypt forest, extending into adjacent moist eucalypt forest with coastal rainforest and patches of coastal scrub particularly favoured (DEC, 2005; NPWS, 2002). Roosting occurs within tree-hollows, under bark and/or palm fronds and within dense foliage with a seasonal shift in roost sites from rainforest edges (summer) to the rainforest interior (winter) (NPWS, 2002; Parnaby in Strahan, 2002; Lunney et al, 1995).	Recorded – A Nyctophilus species was recorded via ANABAT survey efforts. As there are local records of the *Nyctophilus bifax* it is considered probable that this species was recorded.
Atlas Rainforest Ground-beetle (*Nurus atlas*)	E	-	Predicted by the BAM calculator. No records within 10km of the site (Bionet, 2019).	Historically widespread in heavily timbered high rainfall areas east of the Great Dividing Range on the north coast of NSW. The species had not been seen for many years and was thought to be extinct until it was rediscovered in Victoria Park near Lismore in 1973. Presently it is only known from this location and a few others in the Lismore-Alstonville area (OEH. 2019b). Occurs in Low-elevation rainforest and wet eucalypt forest with a well-developed rainforest understorey. Other habitat requirements may be relatively undisturbed old-growth forests on highly productive soils and consistently high moisture levels (OEH. 2019b).	Unlikely – The species is only known to occur within the Lismore-Alstonville area containing a well-developed rainforest understorey (absent from the development footprint). There are no Bionet records of this species within 10km of the site.
Yellow-bellied Glider (*Petaurus australis*)	V	-	Predicted by the BAM calculator. 1 record within 10km of the site (Bionet, 2019).	In NSW, distribution of the Yellow-bellied Glider is essentially coastal, extending inland to adjacent ranges (NSW NPWS 2003). It typically occurs in tall, mature eucalypt forest in regions of high rainfall, but is also known to occur in drier areas (Carthew et al 1999). It inhabits a wide range of forest types but prefers resource-rich forests where mature trees provide nesting hollows and tree species composition provides year-round continuity of food resources (Craig 1985; Kavanagh 1987a; Goldingay and Kavanagh 1999). In north-eastern NSW, preferred habitat is described as either mixed sclerophyll forests of the coastal plains, sub-coastal mid- to high-elevation forests and moist and dry escarpment forests (Gilmore and Parnaby 1994) or dry sclerophyll forests with a grassy or xeric understorey (Mackowski 1986).	Possible – Potential habitat for the glider occurs in association with PCT 1073 and PCT 872 which contains tall mature eucalypt forests with hollows. The species was not recorded within the subject site during nocturnal survey efforts. The yellow-bellied glider was however recorded within the Mebbin Nation Park approximately 2km west of the site within mature Flooded Gum forest.

Species	NSW Listing Status	EPBC Listing status	Source and Bionet Records	Habitat Requirements	Likelihood of Occurrence & Justification
Squirrel Glider (*Petaurus norfolcensis*)	V	-	Predicted by the BAM calculator. No records within 10km of the site (Bionet, 2019).	This species of Glider is associated with dry sclerophyll forest and woodlands although in northern NSW and Qld it has been recorded from wet sclerophyll environments (Suckling in Strahan eds, 2002; Lindenmayer 2002). It is considered to be most abundant in associations containing winter flowering Eucalypts and/or environments with a high abundance of Acacia, Banksia species in the lower layers (Smith & Murray, 2003; Menkhorst et al, 1998; Quinn, 1995). Within the canopy of the preferred habitat numerous trees bearing hollows are critical habitat values required to support populations of the species (Quinn, 1995; Smith & Murray, 2003; Lindenmayer, 2002). Gliders are known to regularly swap den trees and utilise a number of such dens (between 6 and 19 den trees per Glider) within their home range (van der Ree, 2000). These results are supported by survey work undertaken by Southern Cross University (June/July 2002) which indicated that 12 radio tracked gliders utilised 37 den trees incorporating live hollow bearing trees and stags (Cited in Warren, 2004).	Recorded – The species was recorded on several occasions during nocturnal survey efforts. Suitable habitat occurs in association with eucalypt forests (PCT 1073 and PCT 812) containing hollow bearing trees.
Scarlet Robin (*Petroica boodang*)	V	-	3 records within 10km of the site (Bionet, 2019).	'The Scarlet Robin breeds in drier eucalypt forests and temperate woodlands, often on ridges and slopes, within an open understorey of shrubs and grasses and sometimes in open areas. Abundant logs and coarse woody debris are important structural components of its habitat. In autumn and winter it migrates to more open habitats such as grassy open woodland or paddocks with scattered trees. It forages from low perches, feeding on invertebrates taken from the ground, tree trunks, logs and other coarse woody debris. The Scarlet Robin builds an open cup nest of plant fibres and cobwebs, sited in the fork of tree (often a dead branch in a live tree, or in a dead tree or shrub) which is usually more than 2 m above the ground (Higgins and Peter 2002; Debus 2006a,b). Generation length is estimated as 5 years based on the congeneric Flame Robin (Garnett and Crowley 2000)' [DECC online @ http://www.environment.nsw.gov.au/determinations/scarletrobinFD.htm].	Possible – Marginal habitat occurs for the scarlet robin in association with eucalypt forests (PCT 1073 and PCT 812) although the species was not recorded during avifauna survey efforts. Three Bionet records (2002) occurs ~3.5km east of the subject site near Glen Warning.
Brush-tailed Rock-wallaby (*Petrogale penicillata*)	E	V	1 record within 10km of the site (Bionet, 2019).	The Brush-tailed Rock Wallaby occurs in a variety of habitats, ranging from rainforest to sclerophyll forest and open woodland (Eldridge & Close 1995). These habitats must support complex rocky outcrops with numerous ledges, caves, overhangs and crevices are preferred as these provide a variety of shelter and rest sites (Short 1982; Eldridge & Close 1995; Moss *et al*. 1999). Sunny, north facing sites are also preferred (Short 1982). Brush-tailed Rock Wallabies remain in the shelter and safety of refuges for much of the day, emerging to feed during the evening, usually within 200m of the refuge site (Jarman & Bayne 1997). This species feeds predominantly on grasses and forbs and the foliage of shrubs and trees (Short, 1989). Seeds and fruits are eaten on a seasonal basis (Short, 1989). Studies undertaken by Carter and Goldizen (2003) indicated that the wallaby selects foraging locations on the basis of forage quality and/or their ability to see predators, rather than protection from predators amongst vegetation that could conceal them (Carter and Goldizen, 2003).	Unlikely – Preferred habitat (rocky escarpments) absent from the site. The species was not recorded during survey efforts.
Brush-tailed Phascogale (*Phascogale tapoatafa*)	V	-	Predicted by the BAM calculator. No records within 10km of the site (Bionet, 2019).	The Brush-tailed Phascogale has a patchy distribution around the coast of Australia. In NSW it is mainly found east of the Great Dividing Range although there are occasional records west of the divide (OEH. 2019b). The species prefers dry sclerophyll open forest with sparse groundcover of herbs, grasses, shrubs or leaf litter, although also inhabits heath, swamps, rainforest and wet sclerophyll forest. (OEH. 2019b). The phascogale nest and shelter in tree hollows with entrances 2.5 - 4 cm wide and use many different hollows over a short time span (OEH. 2019b).	Possible – Marginal habitat for the phascogale occurs in the form of wet sclerophyll forest and rainforest communities on site. The species was not recorded during nocturnal survey efforts of the site. There are no Bionet records of this species within 10km of the site.

<table>
<tr><th>Species</th><th>NSW Listing Status</th><th>EPBC Listing status</th><th>Source and Bionet Records</th><th>Habitat Requirements</th><th>Likelihood of Occurrence & Justification</th></tr>
<tr><td>Koala
(<i>Phascolarctos cinereus</i>)</td><td>V</td><td>V</td><td>Predicted by the BAM calculator.
74 records within 10km of the site (Bionet, 2019).</td><td>This species primarily occurs within Eucalypt Forest and Woodlands containing a suitable density of favoured food trees within coastal eastern and southeastern Australia. Preferred habitat generally contains a high percentage of primary food trees although underlying geology and soil type can be an important factor. Eucalypt Forests associated with drainage lines and floodplains of richer soil types (i.e. moisture and nutrients) can also be favoured due to feed trees containing higher levels of nutrients and less potential for toxicity (Hindell & Lee, 1990; Moore & Foley, 2000).
Within SEQLD six primary foraging trees were identified by Pahl (1993); Tallowwood (<i>Eucalyptus microcorys</i>), Blue Gum (<i>E. tereticornis</i>), Scribbly Gum (<i>E. racemosa</i>), Grey Gum (<i>E. propinqua</i>), Red Mahogany (<i>E. resinifera</i>) and White Stringybark (<i>E. tindaliae</i>). Further research undertaken by Phillips & Callaghan (1996) in Tweed Shire indicates that Swamp Mahogany (<i>E. robusta</i>) and Blue Gum (<i>E. tereticornis</i>) [including hybrids of the two] on alluvial deposits and Quaternary and Neranleigh-Fernvale Group geomorphologies were considered to be primary habitats. Areas with sub-dominance of these species on Neranleigh-Fernvale alliances supporting Blue Gum (<i>E. tereticornis</i>), Tallowwood (<i>E. microcorys</i>) and/or Grey Gum (<i>E. propinqua</i>) comprise secondary habitat or primary habitat depending on the density of the latter two species. Phillips & Callaghan (1998) also noted Tallowwood to be a primary browse species and two types of Grey Gum (<i>E. propinqua, E. biturbinata)</i> to be secondary browse species in Currumbin.
Recent studies (Biolink, 2007) indicate that <i>Eucalyptus tereticornis, E. microcorys</i> and <i>E. propinqua/E. biturbinata</i> are the most preferred koala food trees throughout the Gold Coast LGA. Within the Tweed Coast Swamp Mahogany <i>Eucalyptus robusta</i> and Forest Red Gum <i>E. tereticornis</i> are the most preferred tree species with Tallowwood <i>E. microcorys</i> and Grey Gum <i>E. propinqua</i> being the next most preferred (Biolink, 2011).
Within utilised Eucalypt Forest habitat the koala spends most of its time in distinct home-ranges which may overlap if available habitat area is reduced. Males are territorial but a dominance-hierarchy exists and they may attack during the summer breeding season. Home ranges of the species are considered to be large and can vary dependent upon habitat quality and extent. Studies have shown various home range sizes exist with the males usually larger than the female (Male 135ha, Female: 110ha [Ellis et al, 2002], Male: 34.4ha, Female: 15ha [White, 1999]).
A review of a number of published scientific reports notes that Koala density generally ranges between 0.02 and 1.26 animals per hectare. Densities are considered to vary dependent upon habitat quality, size, connectivity, presence of impediments to movement (stock fences, dogs, roads etc).
<table>
<tr><th>Source</th><th>Study Location</th><th>Habitat Type</th><th>Additional Comments</th><th>Koala/ha</th></tr>
<tr><td>Dique et al, 2003</td><td>Southeast QLD Pine Rivers Shire</td><td>Tall shrubby open forest (Tertiary surfaces) and Tall open forest upon metamorphics</td><td>Stratified by two habitat descriptions ‘urban’ and ‘bushland’</td><td>0-0.76</td></tr>
<tr><td>Dique et al, 2004</td><td>Southeast QLD Koala Coast ~375sqm of Redland, Logan and Brisbane City shires</td><td>Eucalypt Forests. Predominately RE
12.9-10.4 & 12.11.5</td><td>Study stratified by habitat descriptions: ‘urban’, ‘remnant bushland’, ‘bushland’ and ‘other’. Remnant and bushland areas further stratified by proximity to</td><td>Range 0.02-1.26
Urban: 0.17 +/- 0.013
High remnant: 0.70 +/- 0.023
Low remnant: 0.20 +- /0.014
High bushland: 0.30+/-0.006
Low bushland: 0.11</td></tr>
</table>
</td><td>Recorded – The Koala was recorded within eucalypt forests of the site on several occasions.

Although no mothers with young was observed, it is considered likely that breeding occurs within the subject site given its size and connectivity to expansive areas of bushland.</td></tr>
</table>

			the centre of the study area (high density=close to centre, low density=further away)	+/-0.007 Other: 0
White and Kunst 1990	Southeast QLD Sheldon	Eucalypt Forest		0.4 (0.3-0.46)
Sullivan et a 2004	Southwest QLD	Eucalypt Forest/woodland within the mulgalands	Habitat stratified by floristics and landzone.	0.0007-2.513
Biolink 2007	Coombabah Koala Habitat Area	Mapped gold coast city vegetation (per Ryan et al, 2003) filtered to exclude communities not containing eucalypts	Spot assessment technique for koala faecal pellets. Not based upon koala observation transects per *Dique, 2003; EPA, 2005.*	0.22+/-0.04
Biolink 2007	Coomera-Pimpama Koala Habitat Area	Mapped gold coast city vegetation (per Ryan et al, 2003) filtered to exclude communities not containing eucalypts	Spot assessment technique for koala faecal pellets. Not based upon koala observation transects per *Dique, 2003; EPA, 2005.*	0.23+/-0.03

Species	NSW Listing Status	EPBC Listing status	Source and Bionet Records	Habitat Requirements	Likelihood of Occurrence & Justification
Mountain Frog (*Philoria kundagungan*)	E	-	Predicted by the BAM calculator. No records within 10km of the site (Bionet, 2019).	The Mountain Frog is a habitat specialist associated with mountain streams. It inhabits boggy headwaters of streams and soaks in antarctic beech forests, rainforests and wet sclerophyll forests above altitudes of approximately 550 m (Cogger 2000; Knowles et al. 2004).	Unlikely – Preferred habitat (streams >550m altitude) does not occur on site. There are no Bionet records of this species within 10km of the site.
Loveridge's Frog (*Philoria loveridgei*)	E	-	Predicted by the BAM calculator. No records within 10km of the site (Bionet, 2019).	Loveridge's Frog is a habitat specialist associated with mountain streams. It inhabits boggy headwaters of streams and soaks in antarctic beech forests, rainforests and wet sclerophyll forests above altitudes of approximately 550 m (Cogger 2000; Knowles *et al.* 2004).	Unlikely – Preferred habitat (streams >550m altitude) does not occur on site. There are no Bionet records of this species within 10km of the site.

Species	NSW Listing Status	EPBC Listing status	Source and Bionet Records	Habitat Requirements	Likelihood of Occurrence & Justification
Southern Pink Underwing Moth (*Phyllodes imperialis southern species*)	E	E	1 record within 10km of the site (Bionet, 2019).	The Pink Underwing Moth is distributed from Nambour, south-east Queensland, to Dorrigo in northern NSW (Clarke & Spier-Ashcroft 2003). It is currently known from five locations, of which Mary Cairncross Scenic Reserve, near Maleny (Queensland), contains the only confirmed breeding habitat (NSW SC 2003j). This subspecies occurs within the Burnett Mary and South East (Queensland) and Northern Rivers (NSW) Natural Resource Management Regions (TSSC 2008xy). The Pink Underwing Moth is found below the altitude of 600 m in undisturbed, subtropical rainforest. It occurs in association with the vine *Carronia multisepalea*, a collapsed shrub that provides the food and habitat the moth requires in order to breed (Clarke & Spier-Ashcroft 2003; NSW DECC 2005ag). Where *C. multisepalea* attains an upright form, the association with the moth does not occur (TSSC 2002n). The larvae of the Pink Underwing Moth feed on the vine *Carronia multisepalea* which appears to be relatively rare (NSW SC 2003j).	Unlikely – The vine *Carronia multisepalea* was not recorded within the subject site which is vital for the species.
Common Planigale (*Planigale maculata*)	V	-	Predicted by the BAM calculator. No records within 10km of the site (Bionet, 2019).	This species is known to 'inhabit a broad range of habitats incorporating a dense ground cover layer including rainforest, eucalypt forest, heathland, marshland, grassland and rocky areas (Redhead in Strahan, 2002; Lewis, 2005). In northern NSW, it has been suggested that their distribution often corresponds with the low lying flat and undulating areas of the coastal plains often near intensively settled areas (Gilmore and Parnaby 1994 in Lewis, 2005). *Planigale maculata* is an unspecialised predator foraging mainly on insects, other invertebrates, small vertebrates, and occasionally nectar (Callaghan *et al.* 2005 and references therein). *Planigale maculata* is generally most active from slightly before dusk to before sunrise, interspersed with rest periods and periods of high activity, and is capable of eating the equivalent of its own body weight in food daily (Van Dyck 1979). In contrast, Van Dyck (1979) also notes that *P. maculata* has the ability to enter torpor in response to cold weather or food deprivation. Introduced predators of *P. maculata* include cats (Redhead 1995) and dogs (Fleay 1981) with foxes also considered likely predators (Callaghan *et al* 2005). There is currently little movement data available for *P. maculata* although other members of this genus are widely recognised as having a shifting home range in response to local climatic conditions and food resources (Denny 1982; Read, 1982; 1988; and Miller 1998; in Lewis 2004)' (and in Hannah, 2007: 5) A small population of the species has been recently recorded on the northern banks of the Cobaki Broadwater in association with Swamp Mahogany/Brushbox Forest (Ecopro, 2004; Lewis Ecological Surveys, 2004). A population of Planigales is also known further south of the site within the Koala Beach development where the species has been recorded within Brushbox Forest, Tall Eucalypt dominated Wet Sclerophyll Forest, Swamp Forest, Regrowth Eucalypt Forest and utilising artificial habitats within recorded habitats (AKF, 2005; TSC, 2007). Habitat features that appear most important to the local Planigale population include: i) Dense or scattered tree canopy-cover; ii) Dense ground-cover vegetation; and iii) Areas within or adjacent to low-lying sites subject to seasonally wet conditions, with occasional inundation for short periods (AKF, 2005: 7)	Possible – All forested areas of the site containing dense ground-cover vegetation provides potential habitat for the planigale. Fauna survey efforts failed to record the species. There are no Bionet records of this species within 10km of the site.
Marbled Frogmouth (*Podargus ocellatus*)	V	-	6 records within 10km of the site (Bionet, 2019).	This species favours prefers subtropical or warm-temperate rainforest containing deep, wet, sheltered gullies dominated by stands of Bangalow Palms and/or dense rainforest understorey in SEQld and NENSW (DEC, 2005; Smith et al, 1994; Milledge, 1983). Tracking studies undertaken by Smith et al (1994) indicates that the species occupies a moderately large home range (8-10 hectares) which centres around a creek or gullyline although movements were greatly restricted during the breeding season. Roosts sites are in, or on the margins of, rainforest, frequently associated with vines (Smith *et al.*, 1998).	Recorded – Whilst not recorded within the development footprint, the species was recorded on the subject site within the rainforest gully lines of PCT 1302. These species was also heard vocalizing within Mebbin National Park.
Long-nosed Potoroo (Potorous tridactylus)	V	V	Predicted by the BAM calculator. No records within 10km of	Long-nosed Potoroos are generally restricted to areas with an annual rainfall greater than 760 mm where they inhabit dry and wet sclerophyll forests and woodland with a heathy understorey (Johnson in Strahan, 2002; DEC, 2005). The preferred habitat in north eastern NSW is dry and wet open shrubland (Mason 1997, DEC, 2005, Johnston in Strahan, 2002). In all habitats the species requires relatively thick groundcover growing on friable soils (Bennett, 1993). Within these areas the Potoroo digs for its food the main component of which is hypogeal fungi with other important items	Possible – All forested areas of the site containing dense ground-cover vegetation provides potential habitat for the potoroo.

Species	NSW Listing Status	EPBC Listing status	Source and Bionet Records	Habitat Requirements	Likelihood of Occurrence & Justification
			the site (Bionet, 2019).	including hard-bodied arthropods, vascular plant tissues, seeds and fleshy fruits (Bennett & Baxter, 1989; Claridge et al, 1993). It is also noted that a small, disjunct population of Potoroos exists in a small area of Crown land between the northern shore of Cobaki Broadwater and the NSW-Queensland border (Bali et al, 2003; Ecopro, 2004; Warren & Associates, 1992; Hero, 2001). The extensive 2003 survey undertaken by Bali et al notes that "within the Cobaki area, potoroos were most frequently trapped in Scribbly Gum Mallee Heathland followed by, Tree Broom Heathland, Scribbly Gum/Swamp Mahogany Forest, Black She-oak Heathland, Swamp Mahogany Forest and Scribbly Gum Forest. Our results suggest that potoroos prefer Scribbly Gum Mallee Heathland with an understorey of sedges and grasses such as *Restio* spp., *Lomandra* spp. and *Gahnia* spp., which is found along both sides of the Cobaki Lakes" (Bali et al, 2003: 16).	Fauna survey efforts failed to record the species. Although there are no Bionet records of this species within 10km of the site, the species was recorded proximate to Clarrie Hall Dam (TSC, 2017).
Eastern Chestnut Mouse (*Pseudomys gracilicaudatus*)	V	-	Predicted by the BAM calculator. No records within 10km of the site (Bionet, 2019).	In NSW the Eastern Chestnut Mouse mainly occurs north from the Hawkesbury River area as scattered records along to coast and eastern fall of the Great Dividing Range extending north into Queensland. There are however isolated records in the Jervis bay area (OEH. 2019b). In NSW the Eastern Chestnut Mouse is mostly found, in low numbers, in heathland and is most common in dense, wet heath and swamps. In the tropics it is more an animal of grassy woodlands (OEH. 2019b). Optimal habitat appears to be in vigorously regenerating heathland burnt from 18 months to four years previously. By the time the heath is mature, the larger Swamp Rat becomes dominant, and Eastern Chestnut Mouse numbers drop again (OEH. 2019b). Feeds at night via runways through the grassy and sedge understorey, within an area of less than half a hectare. It has a broad diet of grass stems, invertebrates, fungi and seeds, with the relative significance of each component varying seasonally (OEH. 2019b)	Unlikely – Preferred heath type habitat absent from the site. There are no Bionet records of this species within 10km of the site.
Grey-headed Flying-fox (*Pteropus poliocephalus*)	V	V	Predicted by the BAM calculator. 5 records within 10km of the site (Bionet, 2019).	The Grey-headed Flying-fox inhabits subtropical and temperate rainforests, tall sclerophyll forests and woodlands, heaths and swamps (Eby, 1995). Urban gardens and cultivated fruit crops also provide habitat for this species (NSW NPWS 1999c). Grey-headed Flying-foxes forage on the nectar and pollen of native trees, in particular Eucalyptus, Melaleuca, Banksia (Eby, 2000) and fruits of rainforest trees and vines (NSW NPWS 1999c). During periods when native food is limited, Grey-headed Flying-foxes disperse from colonial roosts, often foraging in cultivated gardens and fruit crops (NSW NPWS 1999c). This species roosts in large aggregations or camps in close proximity (20 km or less) to a regular food source, often in stands of riparian rainforest, Paperbark or Casuarina forest (Eby, 1995). This species is a canopy-feeding frugivore, blossom-eater and nectarivore of rainforests, open forests, woodlands, Melaleuca swamps and Banksia woodlands. As such, it plays an important ecosystem function by providing a means of seed dispersal and pollination for many indigenous tree species (Eby 1996; Pallin 2000). Grey-headed Flying-foxes roost in large aggregations in the exposed branches of canopy trees (Ratcliffe 1931, Nelson 1965a, Parry-Jones and Augee 1992). The locations of camps are generally stable through time, and several sites have documented histories that exceed 100 years (Lunney and Moon 1997). Camps provide resting habitat, sites of social interactions and refuge for animals during significant phases of their annual cycle, such as birth, lactation and conception (Parry-Jones and Augee 1992, 2001). On the basis of current knowledge, roosting habitat that meets at least one of the following criteria can be explicitly identified as habitat critical to survival, or essential habitat, for Greyheaded Flying-foxes. Roosting habitat that: 1. is used as a camp either continuously or seasonally in > 50% of years 2. has been used as a camp at least once in 10 years (beginning in 1995) and is known to have contained > 10 000 individuals, unless such habitat has been used only as a temporary refuge, and the use has been of limited duration (i.e. in the order of days rather than weeks or months) 3. has been used as a camp at least once in 10 years (beginning in 1995) and is known to have contained > 2 500 individuals, including reproductive females during the final stages of pregnancy, during lactation, or during the period of conception (i.e. September to May) (in DECCW, 2009).	Recorded – All forested areas of the site are considered to represent potential foraging habitat for the flying-fox during peak flowering periods. The species was regularly recorded during nocturnal survey efforts foraging on flowering and fruiting species. No flying fox roost camps were recorded within the site. The nearest known GHFF roost camp occurs ~10km northeast of the site within Uki (National Flying-fox Monitoring Viewer, DoEE).

Species	NSW Listing Status	EPBC Listing status	Source and Bionet Records	Habitat Requirements	Likelihood of Occurrence & Justification
Wompoo Fruit-Dove (*Ptilinopus magnificus*)	V	-	Predicted by the BAM calculator. 7 records within 10km of the site (Bionet, 2019).	This species is confined to mature rainforest and adjacent wet sclerophyll environments in eastern Australia from Cape York to around Coffs Harbour. As an obligate frugivore it requires a high availability of fruiting materials which it generally feeds on in the high canopy (Recher et al, 1995).	Possible – Potential foraging habitat occurs on site in association with camphor laurel forest and PCT 1302 which contains a wide variety of suitable foraging material. Whilst not recorded within the subject site, the species was detected within rainforest habitat of Mebbin National Park.
Rose-crowned Fruit-Dove (*Ptilinopus regina*)	V	-	Predicted by the BAM calculator. 2 records within 10km of the site (Bionet, 2019).	This species generally occurs within sub-tropical rainforest, camphor laurel and occasionally wet sclerophyll and swamp forests which contain suitable fruiting species for foraging (DEC, 2005; Recher et al, 1995). As an obligate frugivore a high proportion of fruiting species (figs, lillipillis, laurels etc.) is necessary and as such rainforest habitats are favoured. The species is considered a partial migrant and moves north in autumn/winter and returning in spring/summer to breed (Recher et al, 1995).	Possible – Suitable fruiting species occur in abundance throughout the subject site, in particularly PCT 1302. The rose-crowned fruit-dove was not recorded during survey efforts. A Bionet record (2000) occurs within Mebbin Nation Park ~500m west of the subject site.
Superb Fruit-Dove (*Ptilinopus superbus*)	V	-	Predicted by the BAM calculator. No records within 10km of the site (Bionet, 2019).	This species is known from rainforest and adjacent eucalypt forests which contain suitable fruiting species for foraging (DEC, 2005; Recher et al, 1995). As an obligate frugivore a high proportion of fruiting species (figs, palms, lillipillis, laurels etc) is necessary and as such rainforest habitats are favoured where the species spends most of its time in the canopy. The species is considered a partial migrant and moves north in autumn/winter and returning in spring/summer to breed (Recher et al, 1995).	Possible – Suitable fruiting species occur in abundance throughout the subject site, in particularly PCT 1302. The superb fruit-dove was not recorded during survey efforts. There are no Bionet records of this species within 10km of the site.
Yellow-bellied Sheathtail-bat (*Saccolaimus flaviventris*)	V	-	Predicted by the BAM calculator. No records within 10km of the site (Bionet, 2019).	This species of bats utilises most habitats across its wide distribution and hunts over the canopy in forested areas and lower within mallee or open country (DECC, 2005). Roosting may occur within hollow trees and buildings and also within caves and derelict mines (NPWS, 2004; Richards in Van Dyck and Strahan, 2008). DECC (2005) notes that in treeless areas the sheathtail bat is known to utilise mammal burrows.	Possible – The species may forage over areas of the site although was not recorded during surveys. There are no Bionet records of this species within 10km of the site.
Greater Broad-nosed Bat (*Scoteanax rueppellii*)	V	-	Predicted by the BAM calculator. No records within 10km of the site (Bionet, 2019).	This species of bat favours the gullies and river systems that drain the Great Dividing Range, from north-eastern Victoria to the Atherton Tableland but also extends to the coast over much of its range (DEC, 2005, Hoye & Richards in Strahan eds, 2002). Within this range it favours tall wet forest including creek/river corridors although it will also utilise a variety of other habitats such ranging from dry eucalypt woodlands to rainforest ((DEC, 2005, Hoye & Richards in Strahan eds, 2002). This species is noted to favour roosts within tree hollows although it has also been recorded within buildings (DEC, 2005, Hoye & Richards in Strahan eds, 2002). Radiotracking within Bunjalung National Park noted the species to roost exclusively within Melaleuca quinquenervia (Campbell, 2001).	Recorded – The species was recorded during ANABAT survey efforts of the site. Hollow bearing trees which may provide roosting habitat occurs within the site.
Red-legged Pademelon (*Thylogale stigmatica*)	V	-	Predicted by the BAM calculator. 371 records within 10km of	This species of pademelon is patchily distributed along coastal and subcoastal eastern Australia from Cape York to the Hunter Valley in NSW. Southern range records are from the Watagan Mountains and the Wyong district. There are unconfirmed records from the western New England Tablelands (e.g. west of Emmaville). Within its recorded range the species inhabits forest with a dense understorey and ground cover, including rainforest, moist eucalypt forest and vine scrub. In NSW they are rarely found outside forested habitat and disperse from dense shelter areas to feed from	Recorded – All forested areas of the site containing a dense understory provides potential habitat for the pademelon. The species was recorded on several occasions during fauna survey efforts.

Species	NSW Listing Status	EPBC Listing status	Source and Bionet Records	Habitat Requirements	Likelihood of Occurrence & Justification
			the site (Bionet, 2019).	late afternoon to early morning, favouring native grasses and herbs on the edge of the forest (DECC, 2005 online @ http://www.threatenedspecies.environment.nsw.gov. au/tsprofile/profile.aspx?id=10805).	
Masked Owl (*Tyto novaehollandiae*)	V	-	Predicted by the BAM calculator. No records within 10km of the site (Bionet, 2019).	The Masked Owl lives in eucalypt forests and woodlands from the coast, where it is most abundant, to the western plains (Kavanagh 2002b in NPWS, 2005). Within suitable habitat that species occupies a range of 5-10km^2 where it forages mostly upon rodents and marsupials, although this may be supplemented by bandicoots, arboreal mammals (Sugar Glider, Common Ringtail Possum) and some birds with introduced rodents and rabbits becoming important in disturbed environments (Debus, 1993, Kavanagh, 1996; NPWS, 2005). Habitats containing stands of large, hollow bearing eucalypts are also critical to roosting and nesting (NPWS, 2005; Kavanagh and Murray, 1996).	Possible - The site may fall within the hunting range for the masked owl given the species' large range. The masked owl was not recorded during targeted survey efforts. Several suitable sized hollows occur within the subject site although no evidence of roosting was observed. There are no Bionet records of this species within 10km of the site.
Sooty Owl (*Tyto tenebricosa*)	V	-	Predicted by the BAM calculator. 2 records within 10km of the site (Bionet, 2019).	This species is known predominantly from dry, subtropical and warm temperate rainforest and wet sclerophyll forest of the coastal, escarpment and eastern tablelands regions of NSW (Kavanagh 2002; DEC, 2005). The owl is reported as occupying the easternmost one-eighth of NSW (Debus 1994; DEC, 2005). Within this habitat it feeds largely on mammals ranging from small terrestrial species to medium sized arboreal species such as the Common Ringtail Possum, Sugar Glider, Bush Rat and Brown Antechinus (DEC, 2005; Lundie-Jenkins, 1992). Nesting occurs in large hollow trees which are mostly Eucalypts but can include Moreton Bay Figs and Giant Stinging Trees (DEC, 2005). A very large home range has been estimated as "200-800 ha according to habitat productivity; measured as 3000 ha (1000 ha actually used) for one unmated, nonbreeding individual in marginal habitat, and 450+ ha for one adult female in continuous habitat of mesic gullies within dry forest (Kavanagh 1997, Kavanagh and Jackson 1997 in DEC, 2005: 12). Kavanagh & Stanton (2002) further note that small (<200 ha) fragments do not provide a significant reservoir for populations of large forest owl (Sooty, Powerful, Masked) species.	Recorded – The sooty owl was recorded during nocturnal survey efforts of the subject site. The species was also recorded within Mebbin National Park during survey efforts. Several suitable sized hollows occur within the subject site although no evidence of roosting was observed.
Eastern Cave Bat (*Vespadelus troughtoni*)	V	-	Predicted by the BAM calculator. No records within 10km of the site (Bionet, 2019).	The Eastern Cave Bat is found in a broad band on both sides of the Great Dividing Range from Cape York to Kempsey, with records from the New England Tablelands and the upper north coast of NSW (OEH. 2019b). A cave-roosting species that is usually found in dry open forest and woodland, near cliffs or rocky overhangs; has been recorded roosting in disused mine workings, occasionally in colonies of up to 500 individuals (OEH, 2018). Occasionally found along cliff-lines in wet eucalypt forest and rainforest. Little is understood of its feeding or breeding requirements or behavior (OEH. 2019b).	Recorded – The species was recorded during ANABAT survey efforts of the site. Suitable roosting type habitat (caves) does not occur within the site.
Flora					
Marblewood (*Acacia bakeri*)	V	-	Predicted by the BAM calculator. No records within 10km of the site (Bionet, 2019).	Acacia bakeri has a restricted distribution in north-east New South Wales and south-east Queensland and is found In or near lowland subtropical rainforest, in adjacent eucalypt forest and in regrowth of both (DEH, 2012 online @http://www.environment.nsw.gov.au/threatenedspeciesapp/profile.aspx?id=10004)	Possible – Potential habitat occurs within the development footprint in association with wet sclerophyll forests (PCT 1073 & PCT 812). The species was not recorded during flora surveys and there are no Bionet records within 10km of the site. During the survey period, the species was recorded at a different site by the surveyors within Brushbox dominated wet sclerophyll forest at Pottsville (photo below)

Species	NSW Listing Status	EPBC Listing status	Source and Bionet Records	Habitat Requirements	Likelihood of Occurrence & Justification
Acalypha (*Acalypha eremorum*)	E	-	Predicted by the BAM calculator. No records within 10km of the site (Bionet, 2019).	Grows in subtropical and dry rainforest; north from Lismore district. In subtropical and dry rainforest.	Unlikely – Preferred rainforest type habitat for this species is considered to be absent from the development footprint. The species was not detected during flora surveys and there are no Bionet records of this species within 10km of the site.
Scented Acronychia (*Acronychia littoralis*)	E	E	Predicted by the BAM calculator. No records within 10km of the site (Bionet, 2019).	Scented Acronychia occurs from Fraser Island in Queensland to Port Macquarie in NSW. In 1996, the species occurred at 42 sites (Benwell, 1996). Most populations occur in NSW, between Ballina and Tweed Heads. The two Queensland populations include two trees at the Gold Coast and a few individuals in Great Sandy National Park (NP) (EPA, 2007). In NSW, populations are conserved in Bongil Bongil NP, Bundjalung NP, Broken Head Nature Reserve (NR), Cape Byron NR, Brunswick Heads NR, Cudgen Lake NR and Cooloola NP. Scented Acronychia is found on sand in humid, high rainfall zones (greater than 1600 mm), within 2 km of the ocean. The species occurs in transition zones between littoral rainforest and swamp sclerophyll forest; between littoral and coastal cypress pine communities; and margins of littoral forest and cleared land (Harden, 2002). Associated species include *Lophostemon confertus*, *Banksia integrifolia*, *Callitris columellaris*, *Araucaria cunninghamii*, *Eucalyptus intermedia* and *Melaleuca quinquenervia* (Benwell, 1996). Former habitat has been reduced as a result of coastal development, sand mining, waterlogging and land clearing for agriculture (Hunter et al., 1992; Benwell, 1996) [in DSEWPC, 2008:1-2]	Unlikely – This species occurs on sand within close proximity to the coastline. The site does not occur within 5km of the coast (geographic constraint). The species was not detected during flora surveys and there are no Bionet records of this species within 10km of the site.
Giant Fern (*Angiopteris evecta*)	E	-	Predicted by the BAM calculator. No records within 10km of the site (Bionet, 2019).	Recorded in subtropical rainforest in the Tweed Valley; very rare in N.S.W.	Unlikely – Preferred habitat (rainforest) is absent from the development footprint. The site does not occur within 20km of the coast (geographic constraint). This easily identifiable species was not detected during flora surveys and there are no Bionet records of this species within 10km of the site.
White Lace Flower (*Archidendron hendersonii*)	V	-	Predicted by the BAM calculator. No records within 10km of	This tree has been recorded from riverine and lowland subtropical rainforest and littoral rainforest from north Queensland south to the Richmond River in north-east NSW. It is found on a variety of soils including coastal sands and those derived from basalt and metasediments (DECC, 2005). This species is also known from pasture areas associated with deep red soils within the Billambil Valley (pers. obs.).	Unlikely – Preferred riverine/littoral/lowland rainforest absent from the development footprint.

Species	NSW Listing Status	EPBC Listing status	Source and Bionet Records	Habitat Requirements	Likelihood of Occurrence & Justification
			the site (Bionet, 2019).		The species was not detected during flora surveys and there are no Bionet records of this species within 10km of the site.
Hairy Jointgrass (*Arthraxon hispidus*)	V	V	Predicted by the BAM calculator. No records within 10km of the site (Bionet, 2019).	"In NSW and Queensland, Hairy-joint Grass is found in or on the edges of rainforest and in wet eucalypt forest, often near creeks or swamps (Queensland CRA/RFA Steering Committee, 1997, 1998; DECC NSW, 2005), as well as woodland (Queensland Herbarium, 2008). In south-east Queensland, Hairy-joint Grass has also been recorded growing around freshwater springs on coastal foreshore dunes, in shaded small gullies, on creek banks, and on sandy alluvium in creek beds in open forests (Queensland CRA/RFA Steering Committee, 1997, 1998), and also with bog mosses in mound springs (Queensland Herbarium, 2008)" [Department of the Environment, Water, Heritage and the Arts 2008:1-2]	Possible – Potential habitat for the species occurs in shaded lower laying areas of the site proximate to streams, gullies and the edge of forests. The species was not recorded during flora survey efforts. There are no Bionet records of this species within 10km of the site. As the species dies off during the cooler months, the HJG population at Koala Beach was used as a reference site during the targeted survey period to confirm its presence within the region at the time of surveys (photo below).
Needle-leaf Fern (*Belvisia mucronata*)	E	-	Predicted by the BAM calculator. No records within 10km of the site (Bionet, 2019).	Forms small clumps on trees or rocks in dry rainforest or along creeks in moist open forest (OEH. 2019b).	Possible – Potential habitat occurs in association with streams and wet areas of the site. This epiphyte was not recorded during targeted survey efforts. There are no Bionet records of this species within 10km of the site.
Yellow Satinheart (*Bosistoa transversa*)	V	V	Predicted by the BAM calculator. No records within 10km of	'Three-leaved Bosistoa' is known from the Richmond River, NSW, to Mt Larcom near Gladstone, Queensland. This species is conserved within Mt Warning National Park, Numbinbah Nature Reserve, Limpinwood Nature Reserve and Whian Whian State Forest (Floyd, 1989). Population information is unavailable; however, it has been asserted that this species is common in its range (Hartley, 2004, pers. comm.). This species occurs within the Northern Rivers (NSW), Fitzroy, Burnett Mary and South East Queensland Natural Resource Management Regions.	Possible – Potential habitat occurs in the form of wet sclerophyll forests (PCT 1073 and PCT 812) although the species was not recorded during targeted survey efforts.

Species	NSW Listing Status	EPBC Listing status	Source and Bionet Records	Habitat Requirements	Likelihood of Occurrence & Justification
			the site (Bionet, 2019).	Three-leaved Bosistoa grows in wet sclerophyll forest, dry sclerophyll forest and rainforest up to 300 m in altitude (BRI, n.d.) [in TSSC, 2008:1].'	There are no Bionet records of this species within 10km of the site.
Border Ranges Daisy (*Brachyscome ascendens*)	E	-	Predicted by the BAM calculator. No records within 10km of the site (Bionet, 2019).	Brachyscome ascendens is currently known from one location in NSW in the Border Ranges National Park of northern NSW. It is recorded as rare in south eastern Queensland. It grows in montane shrubland on escarpment cliffs in skeletal rocky soils of basic igneous geology.	Unlikely – Suitable habitat for this species (escarpment cliffs) is considered to be absent from the development footprint. The species is known from only one location in NSW (Border Ranges National Park). The species was not detected during flora surveys and there are no Bionet records of this species within 10km of the site.
Cassia Marksiana (*Cassia marksiana*)	E	-	Predicted by the BAM calculator. No records within 10km of the site (Bionet, 2019).	This species is known from Brunswick Heads, around Murwillumbah, and north into south-east Queensland as far as Beenleigh where it occurs within Littoral and riverine rainforest, and in regrowth vegetation on farmland and along roadsides (DECC., 2005).	Unlikely – Preferred rainforest type habitat absent from the development footprint. The species was not recorded during targeted survey efforts. There are no Bionet records of this species within 10km of the site.
Northern Clematis (*Clematis fawcettii*)	V	V	Predicted by the BAM calculator. No records within 10km of the site (Bionet, 2019).	Stream Clematis occurs most commonly in the canopy gaps of drier rainforests near streams (Halford 1998; Harden 1990; NSW DECCW 2005bl). It has been recorded in (Queensland Herbarium 2009): • semi-evergreen vine thicket • araucarian microphyll vine forest • occasionally, in complex notophyll vine forest • occasionally, in eucalypt woodland communities that are close to vine thicket or rainforest.	Unlikely – Preferred rainforest and vine thicket habitat absent from the development footprint. The species was not detected during flora surveys and there are no Bionet records of this species within 10km of the site.
Native Jute (*Corchorus cunninghamii*)	E	E	Predicted by the BAM calculator. No records within 10km of the site (Bionet, 2019).	The Native Jute occurs in the ecotone of wet sclerophyll forest and dry to dry-subtropical rainforest (e.g. araucarian microphyll vine forest), and in Hoop Pine (*Araucaria cunninghamii*) plantations. It often occurs on hill crests, exposed slopes, ridges or upper slopes of hilly terrain on south or south-east aspect (Halford 1993d; NSW DECCW 2004d). It also occurs on sheltered slopes, gullies and on lower slopes, depending on the topographic position of the sclerophyll-rainforest margin (NSW DECCW 2004d). Sites are at low to mid elevation (150-450 m above sea level) (NSW DECCW 2004d). Soils are generally shallow, stony, well drained and derived from metasediments (Halford 1996c) or dark brown or chocolate soils of basaltic origin (NSW NPWS 1999ap).	Possible – Potential habitat occurs within the development footprint in association with wet sclerophyll forests, although the species was not recorded during targeted survey efforts. There are no Bionet records of this species within 10km of the site.
Corokia (*Corokia whiteana*)	V	V	Predicted by the BAM calculator. No records within 10km of the site (Bionet, 2019).	*Corokia whiteana* has a restricted distribution in north-east NSW (DECC NSW, 2005). Three distinct occurrences of the species are known: Nightcap Range, Tweed Valley, and near Brunswick Heads (DECC NSW, 2005) within the Mt Jerusalem National Park (NP), Nightcap NP, and Whian Whian State Forest (Sheringham & Westerway, 1995). Population counts range from 10 to 23, generally with scattered individuals (Quinn et al., 1995; Sheringham & Westerway, 1995; Karahed, 2002). *Corokia whiteana* occurs at altitudes of 10–800 m above sea level in ecotones between wet sclerophyll forest and Coachwood (*Ceratopetalum apetalum*) warm-temperate rainforests, or in Brush Box (*Lophostemon confertus*) open forest with littoral rainforest understorey (Quinn et al., 1995; DECC, 2005). Common vegetation associations include Black Wattle (*Callicoma serratifolia*) and Mountain Water Gum (*Tristaniopsis collina*) (Quinn et al., 1995). The species usually occurs on substrate derived from rhyolite and basalt, and also on quartzite sands (Quinn et al., 1995; J. Hunter, 2000, pers. comm.)' (DSEWPC, 2008: 1).	Possible – Brushbox dominant wet sclerophyll forest present, although the species was not recorded during targeted survey efforts. There are no Bionet records of this species within 10km of the site.

Species	NSW Listing Status	EPBC Listing status	Source and Bionet Records	Habitat Requirements	Likelihood of Occurrence & Justification
Giant Ironwood (*Choricarpia subargentea*)	E	-	Predicted by the BAM calculator. No records within 10km of the site (Bionet, 2019).	Giant Ironwood is found in dry rainforest regrowth consisting of thickets growing in steeply sloping paddocks on basalt-derived soil as well as in sub-tropical and warm temperate rainforest (OEH, 2018).	Unlikely - This species is only known in NSW from Mount Chincogan near Mullumbimby and one record at Jiggi, northwest of Lismore. Rainforest type habitat absent from the development footprint. The species was not detected during flora surveys and there are no Bionet records of this species within 10km of the site.
Stinking Cryptocarya (*Cryptocarya foetida*)	V	V	Predicted by the BAM calculator. No records within 10km of the site (Bionet, 2019).	The Stinking Cryptocarya is restricted to coastal sands, or if not, then close to the coast (Queensland Herbarium 1999 pers. comm.), occurring in littoral rainforest on old sand dunes and subtropical rainforests over slate and occasionally on basalt to an altitude of 150 m (Floyd 1989; Hyland 1989; Quinn et al. 1995; Sheringham & Westaway 1995).	Unlikely – This species is usually found in littoral rainforest along the coast on sandy soils. The species was not detected during flora surveys.
Smooth Tuckeroo (*Cupaniopsis serrata*)	E	-	Predicted by the BAM calculator. No records within 10km of the site (Bionet, 2019).	Occurs in rocky hillsides and subtropical and dry rainforest (OEH. 2019b).	Unlikely – Preferred rocky hillsides and rainforest absent from the development footprint. The species was not detected during flora surveys.
Cliff Sedge (*Cyperus rupicola*)	V	-	Predicted by the BAM calculator. No records within 10km of the site (Bionet, 2019).	Cyperus rupicola occurs in southern Queensland and north-eastern NSW. In NSW, it is known from two locations, near Mt Warning and within Nightcap National Park. Cliff Sedge grows amongst rocks on the exposed tops of cliffs and on cliff faces or at the base of cliffs, near forest.	Unlikely – Preferred habitat (cliff faces) is considered to be absent from the development footprint. The species was not detected during flora surveys and there are no Bionet records within 10km of the site.
Missionary Nutgrass (*Cyperus semifertilis*)	E	V	Predicted by the BAM calculator. No records within 10km of the site (Bionet, 2019).	Cyperus semifertilis occurs on the NSW north coast and south-east Queensland. In Queensland, it is known from Mount Glorious, Mount Tamborine and Springbrook (Stanley & Ross, 1989). In the southern D'Aguilar Range around Mount Glorious, C. semifertilis occurs in wet sclerophyll forest with Sydney Blue Gum (Eucalyptus saligna) and Brush Box (Lophostemon confertus) (Kington & Blaik, 2004). In NSW, C. semifertilis is known from one site near Mullumbimby, with an estimated population of about 50 plants (DECC, 2005a). At this site it occurs in open forest dominated by White Mahogany (Eucalyptus acmenoides) (DECC, 2005a).	Unlikely – In NSW it is currently known from only one location in the Mullumbimby area where it was growing in open forest of *Eucalyptus acmenoides* with an open understorey. The species was not detected during flora surveys and there are no Bionet records within 10km of the site.
Gympie Stinger (*Dendrocnide moroides*)	E	-	Predicted by the BAM calculator. No records within 10km of the site (Bionet, 2019).	Occurs in CYP, NEQ and southwards as far as north-eastern New South Wales. Altitudinal range from near sea level to 900 m. Usually grows in disturbed areas (particularly where the soil has been disturbed by tractors during logging) in lowland and upland rainforests.	Unlikely – Preferred habitat (disturbed rainforest) is absent from the development footprint. The species was not detected during flora surveys and there are no Bionet records within 10km of the site.

Species	NSW Listing Status	EPBC Listing status	Source and Bionet Records	Habitat Requirements	Likelihood of Occurrence & Justification
Thorny Pea (*Desmodium acanthocladum*)	V	V	Predicted by the BAM calculator. 3 records within 10km of the site (Bionet, 2019).	The Thorny Pea occurs mainly in the Lismore area of north-eastern NSW, but there are also records of the species from near Grafton, Coraki, Casino and the Mount Warning area (DECC, 2005a). The species has been recorded in two reserves —the Mount Warning National Park (though this is a very old record from 1898) and Andrew Johnston Big Scrub Nature Reserve (NSW NPWS, 2007). This species occurs within the Northern Rivers (NSW) Natural Resource Management Region. The Thorny Pea occurs on basalt-derived soils at low elevations, mainly along rivers (Harden, 1991), in dry rainforest and on the fringes of riverine subtropical rainforest (DECC, 2005a). [in DSEWPC, 2008:1].	Possible – Preferred habitat (rainforest) is considered to be absent from the development footprint although the species is known to occur along streams and rivers. The species was not detected during targeted flora surveys. Nearest Bionet record (2005) occurs ~2.5km east of the subject site along the edge of Perch Creek.
Red-fruited Ebony (*Diospyros mabacea*)	E	E	Predicted by the BAM calculator. No records within 10km of the site (Bionet, 2019).	This species 'occurs only in north-east NSW. It is found in a few stands on the Tweed and Oxley Rivers, upstream from Murwillumbah, on Stotts Island in the lower Tweed River and one other small population west of Mullumbimby on the Brunswick River. The largest population is in Limpinwood Nature Reserve. Usually grows as an understorey tree in lowland subtropical rainforest, often close to rivers. Soils are generally basalt-derived or alluvial (OEH. 2019b).	Unlikely – Preferred habitat (rainforest) is absent from the development footprint. The species was not detected during flora surveys and there are no Bionet records
Sweet Myrtle (*Gossia fragrantissima*)	E	E	Predicted by the BAM calculator. 1 record within 10km of the site (Bionet, 2019).	This species is known from dry subtropical and riverine rainforest mostly on basaltic soils (NPWS, 2002).	Unlikely – Preferred habitat (riverine rainforest) for this species is considered to be absent from the development footprint. The species was not detected during flora surveys. There's a 2005 Bionet record of this species along Perch Creek near Nightcap NP, approximately 8km southeast from the subject site.
Isoglossa (*Isoglossa eranthemoides*)	E	E	Predicted by the BAM calculator. 1 record within 10km of the site (Bionet, 2019).	Isoglossa has a very restricted distribution in north east NSW from Tweed River to the Lismore area, with a single uncertain historical report from south east Queensland (NSW DECC 2005). Populations are centred around the upper reaches of the Tweed River (the eastern section of Mount Warning National Park (NP)), and in the vicinity of Inner Pocket Nature Reserve (NR), and to the south east in the Booyong-Nashua-Bexhill-Federal area (Quinn et al. 1995; Sheringham & Westaway 1995). Isoglossa occurs as an understorey component of highly diverse White Booyong (*Argyrodendron trifoliolatum*) subtropical rainforest sub-alliance. This vegetation community occurs in moist, protected situations in coastal lowlands, valleys, riparian zones, floodplains, and at the foothills of coastal ranges. These vegetation communities occur on fertile basic igneous geology (basalt or gabbro), metasediments, or alluvium. Climate of these areas is temperate to warm with reliable non-seasonal rainfall (more than 1300 mm). Subtropical rainforest may extend up escarpment gullies to an altitude of 900 m above sea level but are more common below 600 m. Isoglossa grows in lowland areas and a large percentage of rainforest where Isoglossa occurs (lowland with basic geology) has been cleared for agriculture.	Unlikely – Preferred habitat (rainforest) is absent from the development footprint. The species was not detected during flora surveys. A species record (2004) occurs 5km northeast from the subject site within Cedar Creek (Bionet Atlas).
Davidson's Plum (*Davidsonia jerseyana*)	E	E	Predicted by the BAM calculator.	The Davidson's Plum is restricted to the Brunswick and Tweed River catchments of the north coast of NSW. The southern-most confirmed record of the species is located near Mullumbimby. Records extend only a short distance inland on the Brunswick River. The northern-most and westernmost confirmed record is at Chillingham. There is an unconfirmed record further north near the border gate at Tomewin (Watson	Possible – Potential habitat occurs within the development site in association with PCT 1073 and PCT 812. Easily identifiable species that was not recorded during targeted flora surveys of the development footprint.

Species	NSW Listing Status	EPBC Listing status	Source and Bionet Records	Habitat Requirements	Likelihood of Occurrence & Justification
			1 record within 10km of the site (Bionet, 2019).	1987). There are no confirmed records for southern Queensland. The species has been documented as occurring at a total of 118 point locations, which can be roughly grouped into 24 naturally occurring sub-populations, The Davidson's Plum is found in coastal and lowland subtropical rainforest and wet sclerophyll forest, often with an overstorey including *Lophostemon confertus* (Brush Box), *Araucaria cunninghamii* (Hoop Pine) and/or eucalypt species. Species commonly occurring at Davidson's Plum sites include *Acacia bakeri* (Marblewood), *Cupaniopsis newmanii* (Longleaved Tuckeroo), *Endiandra 211tilize* (Black Walnut), *Eucalyptus microcorys* (Tallowwood), *Flindersia bennettiana* (Bennett's Ash), *Flindersia schottiana* (Cudgerie), *Pentaceras 211tilize* (Crow's Ash), *Synoum glandulosum* (Scentless Rosewood) and the introduced *Cinnamomum camphora* (Camphor Laurel) (McKinley & Stewart 1999). Several sub-populations of the Davidson's Plum are known from areas of regrowth rainforest with a high percentage of Camphor Laurel, *Lantana camara* (Lantana) and other exotic weeds. Some trees are isolated in paddocks or in road reserves (McKinley & Stewart 1999) [in NPWS, 2004)	
Smooth Davidson's Plum (*Davidsonia johnsonii*)	E	E	Predicted by the BAM calculator. No records within 10km of the site (Bionet, 2019).	Current records suggest that the Smooth Davidsonia is found mainly in wet sclerophyll forests, with a smaller number of sites known from subtropical rainforest (complex notophyll vine forest) (McKinley & Stewart 1999). Records of individuals have also been made from land that has been cleared in the past. Plants still persist in these areas as isolated clumps in paddocks or in regrowth dominated by Lantana (*Lantana camara*) and other weed species (DECC, 2004: 5).	Possible – Potential habitat occurs within the development site in association with PCT 1073 and PCT 812. Easily identifiable species that was not recorded during targeted flora surveys of the development footprint. Four (4) planted specimens were detected proximate to a dwelling within Lot 4/DP737440 (photo below). These specimens will be retained.
Small-leaved Tamarind (*Diploglottis campbellii*)	E	E	Predicted by the BAM calculator.	"The forest types in which the species occurs varies from lowland subtropical rainforest to drier subtropical rainforest with a *Lophostemon confertus* (Brush Box) open overstorey. Hunter *et al*. (1992) showed that the species occurs on basalt-derived soils and also on poorer soils such as those derived from quartz monzonite" (NPWS, 2004: 6).	Possible – Marginal habitat occurs within the development site in association with Brush Box wet sclerophyll forests (PCT 812) although the community lacks a rainforest understory. The species was not recorded within the

Species	NSW Listing Status	EPBC Listing status	Source and Bionet Records	Habitat Requirements	Likelihood of Occurrence & Justification
			4 records within 10km of the site (Bionet, 2019).		development footprint during targeted survey efforts. Several planted specimens were noted at the rear of Sphinx Rock Café (photo below) and the Outward Bound facility.
Giant Spear Lily *(Doryanthes palmeri)*	V	-	Predicted by the BAM calculator. No records within 10km of the site (Bionet, 2019).	Giant Spear Lily occurs in far north-east NSW and south-east Queensland. In NSW, it occurs on the coastal ranges that are part of the Mt Warning Caldera. Its southern distributional limit is Mount Billen. The species is currently known from eleven sites within NSW, five of which are conservation reserves. Most populations consist of only a few hundred individuals (OEH. 2019b) Giant Spear Lily occurs on exposed rocky outcrops on infertile soils or on bare rock (OEH. 2019b). It grows in a narrow band of vegetation along the cliff-tops and on steep cliff-faces or rocky ledges in montane heath next to subtropical rainforest, warm temperate rainforest or wet eucalypt forest (OEH. 2019b).	Unlikely – Suitable habitat (exposed rocky outcrops on cliffs) is absent from the development footprint. There are no Bionet records of this species within 10km of the site. The species was not detected during flora surveys.
Basket Fern *(Drynaria rigidula)*	E	-	Predicted by the BAM calculator. No records within 10km of the site (Bionet, 2019).	*Drynaria rigidula* was presumed extinct in New South Wales and has been recently rediscovered. The species is currently known from only 3 locations in N.S.W., although it is common in Queensland. It is a fern that grows on rocks or as an epiphyte from rainforests north from the Clarence River in northern coastal N.S.W (NSW Science Committee, 2015).	Unlikely – Preferred habitat for this species (rainforest) is absent from the development footprint. The species was not detected during flora surveys. There are no Bionet records of this species within 10km of the site.

Species	NSW Listing Status	EPBC Listing status	Source and Bionet Records	Habitat Requirements	Likelihood of Occurrence & Justification
Nightcap Oak (*Eidothea hardeniana*)	E	CE	Predicted by the BAM calculator. No records within 10km of the site (Bionet, 2019).	The nightcap oak is known from a single population on the southern side of the Nightcap Range on the upper north coast of NSW, north east of Lismore. The trees are scattered across a few hectares within Nightcap National Park (DoEE, 2018).	Unlikely – Species is only known from Nightcap National Park. There are no Bionet records of this species within 10km of the site. The species was not detected during flora surveys.
Minyon Quandong (*Elaeocarpus sedentarius*)	E	E	Predicted by the BAM calculator. No records within 10km of the site (Bionet, 2019).	The Minyon quandong was thought to be extinct until 1992 when it was rediscovered in the Whian Whian State Forest in north-eastern NSW. The species is endemic to the Mount Warning Caldera in north-eastern NSW (Maynard et al., 2008). Populations of the Minyon quandong occur in the Mount Jerusalem National Park and Snow Gully Nature Reserve in the Byron Local Government Area and in the Whian Whian State Forest and at Rocky Creek Dam in the Lismore Local Government Area (NSW OEH 2016). Another population also occurs on the other side of the Mount Warning caldera in the McPherson Range north of Murwillumbah (Weber 2009). The Minyon quandong inhabits moist slopes and gullies in or bordering warm temperate/subtropical rainforest usually occurring on clay loam soils over rhyolite amongst a mixed canopy (Maynard et al., 2008).	Unlikely – Preferred habitat for this species (rainforest slopes and gullies) is absent from the development footprint. The species was not detected during flora surveys. There are no Bionet records of this species within 10km of the site.
Hairy Quandong (*Elaeocarpus williamsianus*)	E	E	Predicted by the BAM calculator. No records within 10km of the site (Bionet, 2019).	*Elaeocarpus williamsianus* is currently known from nine populations in north-eastern NSW extending from the Tweed Valley, south to the Byron Bay area. The known range for the species covers an area of approximately 50 km north-south by 30 km east-west (NPWS 2004). *Elaeocarpus williamsianus* occurs along the coastal range within Notophyll vine rainforests and wet sclerophyll ecotones on metasediment -derived soils (Hunter et al. 1991). The species is typically found on steep and eroding slopes at low altitude in gullies, toe slopes, steep drops adjacent to creeks and the headwater areas of creeks. Common dominant canopy species include Camphor Laurel (Cinnimomum camphora), Brush Box (Lophostemon confertus) and Flooded Gum (Eucalyptus grandis). Other dominant species include Lantana (Lantana cammara and Black Apple (Planchonella australis) (Kooyman 2003).	Possible – Potential habitat for the hairy qundong occurs in association with PCT 812. The species was not detected during flora surveys and there are no Bionet records of this species within 10km of the site.
Crystal Creek Walnut (*Endiandra floydii*)	E	E	Predicted by the BAM calculator. No records within 10km of the site (Bionet, 2019).	The Crystal Creek Walnut is known from Pimpama, just north of the Queensland Gold Coast, south to Byron Hills, six km south of Cape Byron, NSW. Several large populations are known. Two are in the ranges to the north of Murwillumbah, where numerous other smaller occurrences are also found. At least 50 individuals are known from the Urliup Road area (Barry & Thomas 1994) and 40–50 trees have been reported from Crystal Creek (R. Cremer pers. comm.). A further concentration of plants is in Mooball National Park where nearly 80 individuals have been recorded (NPWS survey data, 1997). The Crystal Creek Walnut occurs in subtropical (including littoral) rainforest or wet sclerophyll forest, often with *Lophostemon confertus* (Brush Box) in the canopy and occasionally with *Araucaria cunninghamii* (Hoop Pine) emergents. Disturbed and regrowth sites may include *Cinnamomum camphora* (Camphor Laurel) and *Lantana camara* (Lantana) as weed components. Most locations are on soils derived from paleozoic metamorphics, sometimes with basalt nearby. A small number of sites are on alluvium or sand. Sheltered locations are apparently preferred, and landforms including ridgelines, slopes, gullies and creek flats have been documented. The altitude varies between close to sea level up to 430 m above sea level (Floyd 1989)' (in DEC, 2004: 3)	Possible – Potential habitat present in association with wet sclerophyll forests, although the species was not recorded during targeted survey efforts. There are no Bionet records of this species within 10km of the site.
Rusty Rose Walnut *(Endiandra hayesii)*	V	V	Predicted by the BAM calculator.	Rusty Rose Walnut is known from a restricted distribution in northern NSW and southern Queensland (Hyland, 1989). The type specimen of Rusty Rose Walnut comes from Minyon Falls in Nightcap National Park (NP). Records of this species are clustered in the Border Ranges and Nightcap Ranges area, and at a few scattered near-coastal locations. Harden (1990) gives the Clarence River as the southern limit. In NSW, it is also conserved in Mooball NP and	Possible – Potential habitat occurs within the development footprint (PCT 1073 and PCT 812) although the species was not recorded during targeted survey efforts.

Species	NSW Listing Status	EPBC Listing status	Source and Bionet Records	Habitat Requirements	Likelihood of Occurrence & Justification
			21 records within 10km of the site (Bionet, 2019).	Billinudgel Nature Reserve. In Queensland, the species is rare, with locations reported by Barry and Thomas (1994) only at Burleigh Heads, Tallebudgera and Springbrook NP (DEC, 2004). Populations of locations vary from a few stems to moderate numbers of stems mainly in the medium and small size classes (DEC, 2004). The species occurs on poorer soils derived from sedimentary, metamorphic, or acid volcanic rocks. Vegetation includes subtropical and warm temperate rainforests, and Brush Box (Lophostemon confertus) forests, including regrowth and highly modified forms of these habitats. The altitude varies from near sea level to 800 m. Rusty Rose Walnut occurs within the Northern Rivers (NSW) and South East Queensland Natural Resource Management Regions.	Several trees were recorded within Mebbin National Park during the survey period (photo below).
Green-leaved Rose Walnut *(Endiandra muelleri subsp. bracteata)*	E	-	Predicted by the BAM calculator. 11 records within 10km of the site (Bionet, 2019).	'According to the literature the Green-leaved Rose Walnut is known from north-eastern NSW, north from the Clarence River (where a specimen from Maclean was employed in Hyland's 1989 description) to southern and central Queensland (Hyland 1989). The taxon is not considered threatened in Queensland, and is apparently moderately common. In NSW, records nominally of this taxon are concentrated on the Tweed and Byron coasts, but also extend inland to the hinterland ranges, and south to Tuckean, Bungawalbin and Maclean. Records for the combined taxa (E. hayesii and E. muelleri subsp. bracteata) are usually from the poorer soils derived from sedimentary, metamorphic or acid volcanic rocks. Vegetation includes subtropical and warm temperate rainforests and Brush Box forests, including regrowth and highly modified forms of these habitats' (NPWS, 2004: 5).	Recorded – The species was regularly recorded within the subject site, in particularly along the gully lines of PCT 812 and PCT 1302.
Ball Nut *(Floydia praealta)*	V	V	Predicted by the BAM calculator. No records within 10km of the site (Bionet, 2019).	The Ball Nut occurs in small, scattered populations from Gympie, Queensland, southwards to the Clarence River in north-east NSW, where it inhabits riverine and subtropical rainforest, usually on soils derived from basalt (DECC, 2005) or in coastal scrub (Foreman, 1995).	Unlikely – Preferred riverine and subtropical rainforest absent from the development footprint and was not recorded during flora survey efforts. There are no Bionet records of this species within 10km of the site.
Tree Guinea Flower *(Hibbertia hexandra)*	E	-	Predicted by the BAM calculator. No records within 10km of	Chiefly in heath, open forest or rainforest, in ranges around Mt Warning (PlantNET, 2018).	Unlikely – Known habitat types (heath and rainforest) absent from the development site.

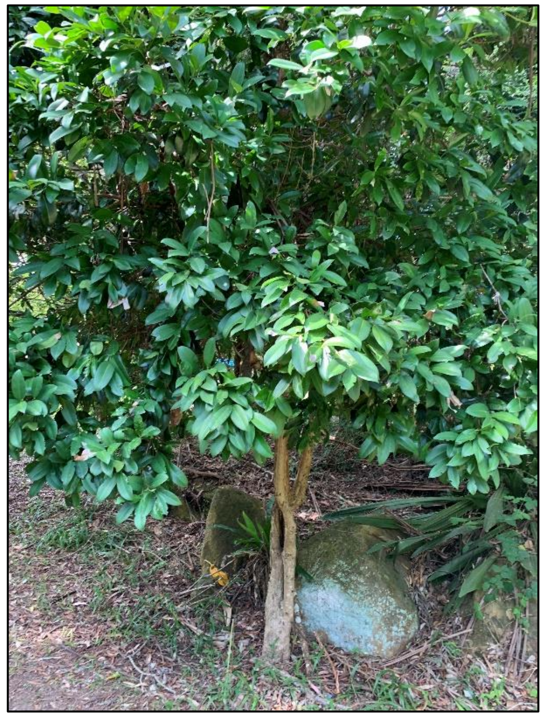
Species	NSW Listing Status	EPBC Listing status	Source and Bionet Records	Habitat Requirements	Likelihood of Occurrence & Justification
			the site (Bionet, 2019).		The species was not recorded during flora survey efforts and there are no nearby Bionet records of the species.
Red Boppel Nut (*Hicksbeachia pinnatifolia*)	V	V	Predicted by the BAM calculator. No records within 10km of the site (Bionet, 2019).	The Monkey Nut occurs from the Gold Coast hinterland in south-east Queensland to the Bellinger and Nambucca valleys in north-east NSW (Floyd 1989; Harden 1991; Weston 1995a). The Monkey Nut occurs as an understorey tree in subtropical rainforest, regrowth rainforest, moist eucalypt forest and Brush Box forest (NSW OEH 2013). This species grows up to 500 m altitude, sometimes extending into nearby wet sclerophyll forest with closed understorey (Barry & Thomas 1994; Stanley & Ross 1986). It usually grows on flat to gently inclined valley flats to steeply inclined slopes and on hillcrests. The soils are mostly slightly acid loams or clay loams and derived from a range of substrates (Barry & Thomas 1994), particularly basalt derived soils (Weston 1995a).	Possible – Potential habitat occurs within the development footprint in association with PCT 1073 and PCT 812 although the species was not recorded during targeted survey efforts. There are no Bionet records of this species within 10km of the site.
Rough-shelled Bush Nut *(Macadamia tetraphylla)*	V	V	4 records within 10km of the site (Bionet, 2019).	This species of nut tree is confined chiefly to the Richmond and Tweed Rivers in north-east NSW, extending just across the border into Queensland where it occurs within subtropical rainforest, particularly on basaltic soils. (Williams, Harden and McDonald, UNE, 1984; DECC, 2005). The species is also commonly noted as a paddock tree on soils of basaltic influence and as an ornamental or orchard tree associated with residential and/or rural activities (pers.obs.).	Possible – Although preferred rainforest type habitat is absent from the development footprint, this species is widely cultivated and commonly recorded as planted specimens within rural lands. Easily identifiable species that was not recorded during targeted flora surveys of the development footprint. Several planted specimens within garden beds were noted at the rear of Sphinx Rock Café (photo below).
Slender Marsdenia (*Marsdenia longiloba*)	E	V	Predicted by the BAM calculator.	Clear Milkvine is known from scattered sites on the NSW north coast from Hastings River northwards to Mount Nebo in Queensland (Forster, 1996).	Possible – Potential habitat occurs in the form of eucalypt forests (PCT 1073 and PCT 812) although the species was not recorded during targeted survey efforts.

Species	NSW Listing Status	EPBC Listing status	Source and Bionet Records	Habitat Requirements	Likelihood of Occurrence & Justification
			No records within 10km of the site (Bionet, 2019).	Clear Milkvine grows in open eucalypt forest, or margins of subtropical and warm temperate rainforest, and in areas of rocky outcrops (Forster, 1996; DECC, 2005a). Associated species include Eucalyptus crebra, E. microcorys, E. acmenoides, E. saligna, E. propinqua, Corymbia intermedia and Lophostemon confertus (QDNR, 2000).	There are no Bionet records of this species within 10km of the site.
Ripple-leaf Muttonwood (*Myrsine richmondensis*)	E	E	Predicted by the BAM calculator. No records within 10km of the site (Bionet, 2019).	The purple-leaf muttonwood is a small, evergreen tree or shrub that grows to 5 metres high. It occurs in the vegetation communities of tall open sclerophyll forest with a rainforest subcanopy, swamp sclerophyll open forest and on the margins of subtropical rainforest (DEC, 2004). The purple-leaf muttonwood occurs in north-eastern New South Wales (NSW) and is currently only known from three populations within the Richmond River and Clarence River catchments. It is estimated that 407 plants exist distributed across these three populations. The three populations occur on private property near Tathan, in Boatharbour Nature Reserve Lismore and in Mallangee National Park, west of Casino (DoEE, 2018).	Unlikely – Preferred rainforest type habitat is absent from the development footprint and the species was not recorded during flora survey efforts. There are only three known populations of this species with the nearest being ~35km to the south within Boatharbour Nature Reserve. There are no Bionet records of this species within 10km of the site.
Rusty Plum (*Niemeyera whitei*)	V	-	Predicted by the BAM calculator. No records within 10km of the site (Bionet, 2019).	Rusty Plum occurs in the coast and adjacent ranges of northern NSW from the Macleay River into southern Queensland where it occurs within rainforest and the adjacent understorey of moist eucalypt forest. Its distributional stronghold is on the mid north coast around Coffs Harbour. (online @ http://www.threatenedspecies.environment.nsw.gov.au/tsprofile/profile.aspx?id=10044).	Possible – Marginal habitat present in the form of moist eucalypt forests (PCT 1073 and PCT 812) although the species was not recorded during targeted survey efforts. There are no Bionet records of this species within 10km of the site.
Yellow-flowered King of the Fairies (*Oberonia complanata*)	E	-	Predicted by the BAM calculator. No records within 10km of the site (Bionet, 2019).	Within New South Wales, there are several historical collections (all pre 1917) of *Oberonia complanata* from Byron Bay and Lismore, and a collection from Coffs Harbour from 1961. Preferred habitat appears to be rainforest, but it can also occur in sclerophyll forest, coastal scrub and mangroves.	Possible – Preferred habitat (rainforest) is absent from the development footprint, although marginal potential habitat occurs in the form of wet sclerophyll forests (PCT 1073 and PCT 812). The species was not recorded during targeted survey efforts and there are no Bionet records of this species within 10km of the site.
Red-flowered King of the Fairies	V	-	Predicted by the BAM calculator. No records within 10km of the site (Bionet, 2019).	Red-flowered King of the Fairies occurs in littoral and subtropical rainforest and paperbark swamps, but it can also occur in eucalypt-forested gorges and in mangroves (OEH, 2019)	Possible – Preferred habitat (rainforest) is absent from the development footprint, although marginal potential habitat occurs in the form of wet sclerophyll forests (PCT 1073 and PCT 812). The species was not recorded during targeted survey efforts and there are no Bionet records of this species within 10km of the site.
Southern Ochrosia (*Ochrosia moorei*)	E	E	Predicted by the BAM calculator. No records within 10km of the site (Bionet, 2019).	The Southern Ochrosia has a sparse distribution from north-east NSW to south-east Queensland. The range of this species extends from the Richmond River in NSW through to the McPherson Ranges, Queensland (Barry & Thomas 1994; Floyd 1989; Forster 1996b; NSW OEH 2013f). Southern Ochrosia grows in riverine and lowland warm subtropical rainforest (Floyd, 1989) and complex notophyll vine forest in soils of volcanic origin (Forster 1993, 1996). This species is often found on hillsides near drainage lines, at	Unlikely – Preferred riverine and lowland rainf and complex notophyll vine forest absent from the development footprint. The species was not recorded during flora survey efforts of the site.

Species	NSW Listing Status	EPBC Listing status	Source and Bionet Records	Habitat Requirements	Likelihood of Occurrence & Justification
				elevations of 100–1000 m above sea level. Soils are deep, alluvial or basalt derived, well-drained, and reddish-brown to dark brown.	There are no Bionet records of this species within 10km of the site.
Onion Cedar (*Owenia cepiodora*)	V	V	Predicted by the BAM calculator. 4 records within 10km of the site (Bionet, 2019).	This species is known from subtropical and dry rainforest on or near soils derived from basalt from the Richmond River north to just north of the Qld border (DEC, 2005; BSC, 2006)	Possible – Although preferred rainforest type habitat is absent from the development footprint, the species was recorded along the edge of Bog Onion Road within Mebbin National Park (photo below). The species was not recorded within the development footprint during targeted surveys.
Wollumbin Dogwood (*Ozothamnus vagans*)	E	V	Predicted by the BAM calculator. No records within 10km of the site (Bionet, 2019).	*Ozothamnus vagans* prefers areas of disturbance and grows in open, sunny locations on rhyolite or basalt soils at altitudes greater than 500 m. The species is found on escarpment edges (i.e. at the top of ranges); margins of, or within large canopy gaps (e.g. treefall, rocky ledges, tracks) of, wet sclerophyll forest, subtropical rainforest and cool temperate rainforest; and roadsides (NSW OEH 2014). Along roadsides where shading occurs it grows as a straggly shrub, however, in higher light settings, such as on rock outcrops, individuals grow to 2 m tall (Scott 2011).	Unlikely – Preferred habitat (altitude >500m) absent from the development footprint and was not recorded onsite during flora surveys. There are no Bionet records of this species within 10km of the site.
McPherson Range Pomaderris (*Pomaderris notata*)	V	-	2 records within 10km of the site (Bionet, 2019).	The species occurs in Queensland and reaches its southern distributional limit in New South Wales. In New South Wales it is known from rocky basalt ranges in montane heaths and scrubs, or in depauperate rainforest. It has been collected from the McPherson and Tweed Range areas of far northern New South Wales (NSW Scientific Committee, 2018).	Unlikely – Preferred habitat absent from the development footprint. Species was not recorded during flora surveys. Bionet record (2005) ~1km east of the subject site within along Kunghur Creek, within Kunghur Village.
Spiny Gardenia (*Randia moorei*)	E	E	Predicted by the BAM calculator. No records within 10km of the site (Bionet, 2019).	The known range of the Spiny Gardenia extends from Lismore on the north coast of NSW, northwards to the Logan River, southern Queensland (Quinn et al. 1995). The Spiny Gardenia occurs in subtropical, riverine, littoral and dry rainforest and sometimes along moist scrubby watercourses. In NSW the species is often found in Hoop Pine (Araucaria cunninghamii) - Brush Box (Lophostemon confertus) forest with other rainforest elements present in the understorey. Although plants are typically found within rainforest or in Hoop Pine - Brush Box forest, at Terranora in Tweed Shire and on the southern slopes of Mount Chincogan in Byron Shire, the Spiny Gardenia occurs as a scattered remnant shrub in open grazing land that was formerly rainforest (NPWS, 2004: 3-4).	Possible – Potential habitat occurs within the development footprint in association with PCT 812 although the species was not detected during targeted surveys. There are no Bionet records of this species within 10km of the site.

Species	NSW Listing Status	EPBC Listing status	Source and Bionet Records	Habitat Requirements	Likelihood of Occurrence & Justification
Pointed Trefoil (*Rhynchosia acuminatissima*)	V	-	Predicted by the BAM calculator. No records within 10km of the site (Bionet, 2019).	*Rhynchosia acuminatissima* is usually found in or near dry Araucarian rainforests (Harden 2002). Other species with which Pointed Trefoil is associated include Brush Box *Lophostemon confertus*, Grey Ironbark *Eucalyptus siderophloia*, Rough-leaved Elm *Ahananthe philipinensis* and Native Holly *Alchornea ilicifolia* (OEH, 2018).	Possible – Potential habitat occurs within the development footprint in association with PCT 812 although the species was not recorded during targeted survey efforts. There are no Bionet records of this species within 10km of the site.
Scrub Turpentine *(Rhodamnia rubescens)*	CE	-	5 records within 10km of the site (Bionet, 2019).	In New South Wales (NSW), *Rhodamnia rubescens* is currently known to occur from coastal districts north from Batemans Bay, approximately 280 km south of Sydney, to the Queensland (Qld) border. Populations of the species extend north to Maryborough, Qld. NSW populations of R. rubescens are mainly coastal and occasionally extend inland onto escarpments up to 600 m a.s.l. in areas with rainfall of 1,000–1,600 mm (Benson and McDougall 1998). Populations and individuals of R. rubescens are often found in wet sclerophyll associations in rainforest transition zones and creekside riparian vegetation (Benson and McDougall 1998). *Rhodamnia rubescens* commonly occurs in all rainforest subforms except cool temperate rainforest. The species occupies a range of volcanically derived and sedimentary soils and is also a common pioneer species in eucalypt forests (Floyd 1989).	Recorded – The species is abundant throughout the site and was frequently recorded within PCT 1073 and PCT 812 during targeted survey efforts. It is noted that this species has only recently been added as a threatened species and the BAM calculator has not been updated to include this species. Targeted surveys included this species from February 2019 onwards.
Native Guava *(Rhodomyrtus psidioides)*	CE	-	Predicted by the BAM calculator. 1 record within 10km of the site (Bionet, 2019).	In New South Wales (NSW), Rhodomyrtus psidioides is currently known to occur from Broken Bay, approximately 30 km north of Sydney, to the Queensland (Qld) border. Populations of the species extend north to Gympie, Qld. NSW populations are typically restricted to coastal and sub-coastal areas of low elevation however the species does occur up to c. 120 km inland in the Hunter and Clarence River catchments and along the Border Ranges. The species occurs in rainforest and its margins with sclerophyll vegetation, often near creeks and drainage lines. *Rhodomyrtus psidiodes* is a pioneer species in disturbed environments (Williams and Adam 2010) and is locally common in disturbed areas, such as regrowth and rainforest margins.	Possible – Potential habitat present in the form of wet sclerophyll forests (PCT 1073 and 812) although the species was not recorded during targeted survey efforts. It is noted that this species has only recently been added as a threatened species and the BAM calculator has not been updated to include this species. Targeted surveys included this species. There is one Bionet record of this species within 10km of the site.
Rainforest Cassia (*Senna acclinis*)	E	-	Predicted by the BAM calculator.	This species grows in or on the edges of subtropical and dry rainforest within coastal districts and adjacent tablelands of NSW from the Illawarra in NSW to Queensland (DECC online @ http://www.threatenedspecies.environment.nsw.gov.au/tsprofile/profile.aspx?id=10753).	Recorded – The species was recorded on several occasions within PCT 1073 containing regenerating rainforest within the understory.

Species	NSW Listing Status	EPBC Listing status	Source and Bionet Records	Habitat Requirements	Likelihood of Occurrence & Justification
			No records within 10km of the site (Bionet, 2019).		
Brush Sophora (*Sophora fraseri*)	V	V	Predicted by the BAM calculator. No records within 10km of the site (Bionet, 2019).	It grows in moist habitats, often in hilly terrain at altitudes from 60–660 m on shallow soils along rainforest margins in eucalypt forests or in large canopy gaps in closed forest communities (Queensland CRA/RFA Steering Committee, 1998).	Possible – Potential habitat occurs along margins of wet sclerophyll forests of the site (PCT 1073 and PCT 812) although the species was not recorded during targeted survey efforts. There are no Bionet records of this species within 10km of the site.
Red Lilly Pilly (*Syzygium hodgkinsoniae*)	V	V	Predicted by the BAM calculator. No records within 10km of the site (Bionet, 2019).	Smooth-bark Rose Apple occurs in riverine rainforest on rich alluvial or basaltic soils, from the Richmond River in NSW to Gympie, Queensland, with a disjunct occurrence in north Queensland (Floyd, 1989; NSW NPWS, 2002). The species occurs mostly as scattered individuals along watercourses, where the habitat is frequently limited and degraded (Landmark Ecological Services, Ecograph & Terrafocus, 1999).	Possible – Marginal habitat occurs onsite along watercourses and gully lines although the species was not recorded during targeted survey efforts. There are no Bionet records of this species within 10km of the site. The species has been recorded on numerous occasions along Clarrie Hall Dam gully lines (TSC, 2017).
Durobby (*Syzygium moorei*)	V	V	Predicted by the BAM calculator. No records within 10km of the site (Bionet, 2019).	The Durobby occurs in warm, protected, fertile soils in riverine and gully rainforests at low altitudes, along sections of the Richmond, Brunswick and Tweed Rivers in NSW, as well as at three sites in Upper Mudgeeraba Creek and Upper Tallebudgera Creek in south-east Queensland (Floyd, 1989). Rose Apple is most commonly found in Subtropical Rainforest *Argyrodendron trifoliatum* Alliance, including sub-alliance 1 (*Argyrodendron trifoliatum*) on lowland krasnozem; suballiance 2 (*Toona-Flindersia* spp.) on lowland alluvium; and sub-alliance 6 (*Archontophoenix-Livistona*) on alluvium with excess moisture (Floyd, 1990). Stands of the *A. trifoliatum* Alliance originally occurred on the best potential agricultural land, so consequently was mostly cleared, with the exception of small patches occurring in floodprone, stony or poorly drained soils (DSEWPC, 2008:1-2).	Possible – Marginal habitat occurs onsite along watercourses and gully lines. Within rural areas, species regularly found as individual trees within grassed paddocks or planted within garden beds. No naturally occurring Durobby were recorded within the development footprint. Several Durobby (*Syzygium moorei*) were recorded within a yard proximate to a dwelling on Lot 34 DP755714 which is currently within the proposed development footprint. These specimens were obviously planted within this location amongst other ornamental/landscape species and have not been assessed any further.

Species	NSW Listing Status	EPBC Listing status	Source and Bionet Records	Habitat Requirements	Likelihood of Occurrence & Justification
					In addition, several planted specimens were observed within garden beds at the rear of Sphinx Rock Café (photo below) and the Outward Bound facility. 

Notes: Only Bionet Atlas Records from 1st January 1999 onwards was considered. All information in this table is taken from NSW OEH and Commonwealth DoEE Threatened Species profiles (OEH, 2018c; DoEE 2018b) unless otherwise stated.
Listing Status Codes: CE – Critically Endangered, E – Endangered and V – Vulnerable.